



NAWAB SALAR JUNG BAHADUR.

POTTERY.

CASSELL'S
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OF GENERAL INFORMATION

WITH COLOURED PLATES AND MAPS
AND NUMEROUS FULL-PAGE ENGRAVINGS

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LIST OF PLATES.

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CASELL'S ENCYCLOPÆDIA OF GENERAL INFORMATION.

Pews (Latin, *podium*, a balcony or iron seat in the amphitheatre where the emperor and other distinguished persons sat). This name has been given to boxes in theatres and to the raised enclosures used by lawyers, money-lenders and cashiers. As early as the 14th century reference is made to church seats as *punes* in *Piers Plowman's Vision*, and in the 15th century they are spoken of as *pues*. Until their introduction the worshippers either stood or sat upon the floor or on little stools. The earliest pews remaining appear to be those in Fressingfield Church, in Suffolk, dating from the latter half of the 15th century, and in St. Mary's Church, Geddington, Northamptonshire, dating from 1602. The benches faced eastwards, having partitions about 3 feet high with carved ends rising above the wainscoting. Doors began to appear and eventually square pews became the fashion. Comfort transformed the square box into a small drawing-room, with walls lined and cushioned, a stove, a private door to the churchyard and, to ensure privacy, high partitions with curtains, until their impropriety became a cause of scandal and led to their abolition. The assignment of seats gave rise to what became an abuse. Patrons claimed the right to a particular seat and the system of appropriation was extended to the chief people. Rights were acquired (by faculty or prescription) to the injury of the poor, who no longer met the rich on equal ground in God's House, and this was plainly contrary to St. James's warning (St. James, ii. 2-9). The Free and Open Church Association, started in 1865, has done much in England towards restoring the parish churches to the parishioners. Seats may still be assigned and rents charged in new churches under several Acts of Parliament, but to let pews except under these Church-Building Acts has been declared illegal. In Common law every parishioner has a right to a seat and the churchwardens are bound to place each person. Pews are profitably let by annual competition in parts of the United States, and in Scotland they are assigned by the heritors, parishioners having a first claim to them. In the towns the custom is to let them.

Pewter consists of an alloy of lead and tin in the proportion of one part of the former to four parts of the latter. It melts more easily than

either of its constituents, and possesses greater hardness. It is largely used for the manufacture of drinking vessels and kitchen utensils. Old pewter articles are in great request by collectors, and objects in what is called "art pewter" have proved very saleable.

Pfeiffer, IDA LAURA, traveller, was born at Vienna on October 14th, 1797, her father being a merchant named Reyer. She married, in 1820, Dr. Pfeiffer, a lawyer of Lemberg, many years her senior. Falling unjustly into obloquy his practice declined and his wife, living mostly apart from him, contrived to educate their two sons. This achieved and despite her poverty, she determined to gratify her longing for travel and adventure. In 1842 she toured in Egypt and the Holy Land; next year she visited Scandinavia and Iceland; from 1846 to 1848 she was occupied with a tour around the globe, starting westwards and returning by the east; in 1851 to 1854 she was engaged in visiting the Malay Archipelago, Australia, South and North America; and in 1856 she travelled in Madagascar. Of every trip she wrote an account, and her books enjoyed a very considerable vogue. Lending herself inadvertently to a Frenchman's plot against the Malagasy government, she was expelled the island with brutal usage and her later sufferings in Mauritius no doubt hastened her end. She died in Vienna on October 27th, 1858. It has been estimated that she travelled 150,000 miles by sea and 20,000 by land. She was made an honorary member of the Geographical Societies of Berlin and Paris.

Pfeiderer, OTTO, Protestant philosophic theologian, was born at Stetten near Cannstadt, in Würtemberg, Germany, September 1st, 1839. He first studied under Baur at Tübingen from 1857-1861, and afterwards came for further study to England and Scotland. Becoming a pastor at Heilbronn in 1868 and professor of theology at Jena in 1870, in 1875 he was appointed to the chair of Systematic Theology in Berlin. As a follower of Baur, he was widely known by his writings on New Testament criticism, but he is an independent thinker and profoundly learned. In 1885 he delivered a course of Hibbert Lectures in London and in 1894 the Gifford Lectures in Edinburgh, and his

work *The Development of Theology since Kant*, which appeared in 1890, was written for publication in England. His younger brother EDMUND PFLEIDERER (1842-1902), who served as an Army chaplain during the Franco-German war, also won distinction as a writer on philosophical subjects.

Pforzheim, a town of the Grand Duchy of Baden, Germany, situated on the verge of the Black Forest at the junction of the Nagold, Wurm and Enz, 16 miles S.E. of Carlsruhe. It contains the remains of an ancient castle, the castle church and stadthaus. Among the chief industries are the manufacture of gold and silver ware and trinkets (employing many thousand hands), chemicals, leather and textiles, besides machine-making, bleaching, copper-working, oil- and saw-mills. Much timber is floated to the Rhine by the Enz and Neckar. There is a considerable trade in fruit, oil, wine and cattle. The town was the *Porta Hercyniae* of the Romans, in allusion to its position in the Forest. The French destroyed it in 1689, but it has belonged to Baden for upwards of six centuries. Pop. (1900), 43,097.

Phædrus, a Latin poet of the 1st Christian century, who wrote fables in imitation of those known as *Æsop's*. He was born in Macedonia, and became the slave and eventually the freedman of Augustus. His five books of *Fables* are remarkable for their succinct and pointed style of narrative and their elegant versification.

Phæodaria, the order of Radiolaria, which includes the most specialised forms. The members of this differ from the Nassellaria by the fact that the membrane which encloses that part of the body known as the central capsule is double and that the main mouth aperture or "astropyle" of the shell is surrounded by a dark mass or phæodium formed of rounded dark-greenish bodies known as the phæodellæ. This order and the Nassellaria together form the sub-class Oculosa. There is usually a complex skeleton, but this is absent in the group Phæocystina. All the living forms are marine; many fossil forms are also known.

Phæthón (Greek, "the shining one"), originally identical with Helios the sun-god, but, in the later mythology of Greece, the presumptuous son of Helios and the ocean nymph Clymene, who induced his father to allow him to guide his chariot over the sky. The result was that the horses broke loose, and the earth would have been set ablaze if Zeus had not slain Phæthón with his thunderbolt. He fell to earth at the mouth of the Eridanus, or Po, on the banks of which his disconsolate sisters were changed into poplars and their tears into amber. Though one does not too closely scrutinise fable, it has been pointed out that the Vistula or Oder, where amber abounds, would fit the legend better than the Po. But the first beggetter of the story had not thought of that.

Phagocytosis, the process of eating up of invading organisms by the white or colourless blood-corpuscles (the phagocytes or leucocytes), which have been rather aptly called "the police of the

blood," if indeed they might not be likened unto beneficent cannibals. This species of activity on the part of the white blood-corpuscles has been studied and described by Metschnikoff, and final importance must be attributed to researches which go to prove that the phagocytes wage constant war with the disease-bearing microbes that enter the circulation.

Phalanger, an animal belonging to the Marsupial genus *Phalangista*, with five species, all about the size of a cat, from the East Indian Archipelago.



VULPINE PHALANGER.

The fur is thick and woolly, and the prehensile tail naked at the end. They are generally vegetable-feeders. [FLYING PHALANGER.]

Phalangida, an order of the class Arachnida, the members of which are characterised by the extreme length of their legs and the breadth of the abdomen, which is not marked off from the cephalothorax by any marked line of separation; the abdomen is in general form like that of the spiders, but it is segmented. The typical genus is *Phalangium*. The body in the members of this genus is usually about an eighth of an inch in width, while the span of the legs is about an inch and a half. Their popular name is "Harvest-men."

Phalanx, a division of infantry drawn up in ranks of several files deep, adopted in the military system of ancient Greece. In the Macedonian phalanx, the latest and most celebrated form, the men were sixteen deep. They wore armour and carried spears from 21 to 24 feet long. In battle array the shields constituted a continuous rampart and the ranks were so disposed that every five spears, borne pointed forwards and upwards, protected a soldier in front. In the Spartan phalanx the men were four to eight deep. On smooth ground, and with its flanks covered by light infantry, the phalanx was irresistible, but it was cumbersome and slow, and when broken could scarcely be re-formed. It was open to attack, too, with deadly effect by the archers.

Phalaris, tyrant of Agrigentum, in Sicily, who flourished in the 6th century B.C. He came

to be regarded as the type of a vile despot, owing to the legend that he burnt his victims alive in a brazen bull, their yells of agony, conveyed through pipes in the figure's nostrils, representing the bellowing. This instrument of torture was invented by Perilaus of Athens, who shared the fate of so many inventors by being the first victim of his own ingenuity. This story was probably a reminiscence of human sacrifices offered to the Phœnician Baal. The first mention of the *Letters* purporting to be written by Phalaris occurs in the writings of Stobæus (circa A.D. 500); their genuineness was doubted by Politian and Erasmus, and finally disproved by Richard Bentley in his *Dissertation on the Epistles of Phalaris* (1697).

Phallic Worship, a general term for the rites in which the male organ of generation figures as a magical or religious emblem. These rites, which still claim many followers in India, probably had their origin among races of low culture, who hoped by their means to induce fruitfulness among their flocks and herds and fertility in their cultivated lands. The phallus, the emblem of these rites, took many shapes, as a rude stone, a pinecone, a pillar, etc. The Jews borrowed these rites from their heathen neighbours, and their women made phallic emblems of gold and of silver (Ezek., xvi. 17). Wastropp and Wake note three phases in the representation of this emblem: (1) when it was an object of reverence; (2) when it was used as a protection against the evil eye, as it is in Italy at the present day; (3) when it was used as an emblem of licentiousness. E. B. Tylor classes phallic worship with stock-and-stone worship generally, there being no doubt that the first symbols of the gods were unhewn stones, some of which were revered long after idols—that is, figures—had become common.

Phanerogamia (from the Greek *phaneros*, "evident"; *gamos*, "marriage") is the most common scientific name for the great sub-kingdom of the Vegetable Kingdom otherwise known as Spermatophyta, or as Flowering Plants. They are so called in contradistinction to the name Cryptogamia applied to all other plants, on account of their having relatively large and distinct reproductive organs collected together as a flower. This character is not, however, so truly distinctive as the possession of seed, to which they owe the later name of Spermatophyta. In common with the Bryophyta and Pteridophyta, they generally exhibit a marked alternation of generations and, though only in a reduced condition, their oosphere is enclosed in an archegonium, from which the three sub-kingdoms are collectively termed Archegoniata. In common with the Pteridophyta, they have a sporophyte far more developed than the gametophyte or oophyte, the latter being, in fact, mere appendages of the former, which is a plant with distinct stem and leaves (cormophytic) and well-developed vascular tissue. In the flower there are often leaves modified as secondary sexual organs in addition to the sporophylls, known as sepals and petals. The male sporophyll or stamen is not very similar to any structure among lower plants;

and its microspores (pollen-grains) have a most rudimentary prothallium, consisting of one or more included cells, and do not produce motile antherozoids. The megaspore or embryo-sac is enclosed in the ovule or unfertilised seed which, though sometimes axial, is generally an appendage of a female sporophyll or carpel. [PLACENTATION.] Besides the female prothallium, or archisperm, a secondary similar tissue, or metasperm, is in some cases developed within the embryo-sac after fertilisation, and also an external nutritive tissue, or perisperm. The whole seed, enclosing these tissues and the embryo, separates from the parent plant when ripe. The sub-kingdom is primarily divided into the divisions Angiospermia and Gymnospermia.

Phanerozoata, the sub-class of the Asterioidea or Starfishes in which the marginal plates or ossicles are very large. In the other sub-class or Cryptozoata there are no such marginal plates as in the common Sand-star (*Asterias rubens*). The commonest English member of the Phanerozoata belongs to the genus *Astropecten*, but it is not often found except by dredging. The order includes the majority of the fossil forms.

Pharaoh, the title applied to the ancient kings of Egypt by the Hebrews. It indicates, therefore, the regal status and not, as is often supposed, a personal sovereign whose name was Pharaoh. The term is not found in the Tel-el-Amarna letters, and it is extremely doubtful whether it occurs anywhere else in cuneiform literature.

Pharetrones, an extinct family of calcareous Sponges belonging to the order Calcispongiae, allied to the existing family the Leuconidae. It ranged from the Devonian to the Upper Chalk. Its geological distribution is of interest, as the species all seem to have lived in shallow-water deposits.

Pharisees (= "SEPARATISTS,") a strict sect of the Jews, not mentioned in the Old Testament, but possibly the same as the Hasidæans mentioned in the Maccabees. The sect was probably formed in the time of Antiochus Epiphanes with a view to resisting his Hellenising efforts. Their cardinal principle was absolute separation from everything non-Jewish. They had perfect antipathy to foreign ideas, ways and political alliances. Israel was the chosen people, the elect, and it was their highest duty to keep rigidly and scrupulously to themselves—a church within a church. Their patriotism was entirely tinged with religiosity. They appear to have believed in the immortality of the soul, the resurrection of the body and a state of future retribution. They confidently expected a literal reign of God on the earth: the Messianic Kingdom was to be a kingdom of saints and they were the saints. They believed in angels and spirits, the providence of God and man's free will. Their chief characteristics were intolerance and narrowness, and the overriding of law by the authority of tradition; Jesus accuses them of rendering the law of no effect by their tradition, and of binding undue burdens on men's shoulders. Josephus, who was one of them, tones down their views, and

represents them as forming a philosophical system, but at best they seem to have been a set of bigoted Chauvinists. The Mishna, or first part of the Talmud (which dates from the 2nd century of our era), shows their influence, and rates highly the opinions of Hillel, Shammai and Gamaliel. This interprets the law by the light of (1) the decisions of the Great Synagogue, (2) the decrees of prophets and wise men, (3) the legal decisions of proper authorities, and forms a whole system of elaborate casuistry. The Pharisees professed great reverence for the Rabbis, and formed an exclusive sect, who looked down upon the common herd of Jews. St. Paul bears witness to their talent for persecution. Paying the utmost regard to the letter of the literal and oral law, it was not to be wondered at that they divorced morals and religion, placed non-essentials on the same plane as essentials and ultimately transformed their whole system into hypocrisy. Thus in later times the word Pharisee came to be accepted as a synonym for an ostentatious observer of the external forms of religion without respect for its inward spirit, and finally for a humbug and hypocrite.

Pharmacopœia, from two Greek words signifying "a drug" and "to make." The *British Pharmacopœia* is an official publication containing a list of medicines and compounds, and the manner of preparing them, with their doses, etc., which is issued by the General Medical Council. The first *British Pharmacopœia* was published in 1864, and several editions have appeared since. The earliest work of the kind was published at Nuremberg in 1542. This was a collection of prescriptions gathered from all sources by a student named Valerius Cordus. Its evident utility favourably impressed the physicians of the town, and he was induced to publish it under authority. The *United States Pharmacopœia* is revised every ten years by a committee representing the different medical and pharmaceutical colleges and societies and delegates from the medical branches of the army and navy.

Pharos, a so-called island or peninsula at Alexandria, Egypt, on which part of the city stands. In ancient times the Ptolemies Soter and Philadelphus erected a lighthouse at the extremity (the east end) of the island, where was the entrance to the port. It was built of marble and adorned with sculpture, and cost £165,000. Its light was visible for 100 miles and it was regarded as one of the Seven Wonders of the World. In course of time it was allowed to fall into decay, but the name came to be applied in a general sense to any lighthouse. The Romans built a Pharos in Dover Castle which is still in a very fair state of preservation.

Pharynx, a muscular-membranous cavity at the base of the skull, at the back of the interior nasal apertures, mouth and larynx. It is continued below into the œsophagus or gullet and above it communicates with the posterior nasal passages, the Eustachian tubes of the ear, the mouth and the larynx. It is affected readily by catarrh, inflammation and other throat diseases.

Phase, in physics, any one point or portion in a recurring series of changes, especially when contrasted with another point. The distance whereby one set of waves is in advance of another is known as difference of phase. In astronomy the term is applied to the particular appearance of the moon or a planet at a given time, or to the recurring appearances of either in respect of the seeming form of the illuminated portion of its disc.

Pheasant, a bird belonging to the Gallinaceous family Phasianidae from eastern Asia. The family is considerably broken up by Daniel Giraud Elliot; but three sub-families—the Peacocks, the true Pheasants, and the Guinea-fowls—stand out distinctly from the rest. In the true pheasants the head may be crested or with lateral tufts, the tail is greatly elongated, and the two central feathers overlap those next on each side. In the type-genus Phasianus the bill is strong and of moderate length; the upper mandible convex, naked at the base, where are the nostrils, covered by a scale, and bent downwards at the tip. The cheeks and skin round the eye bear no feathers, but have a warty red covering. The wings are short; the tail, which is long and wedge-shaped, is of eighteen feathers. The hind toe articulates with the tarsus, which in the male bears a sharp horny spur. The species are numerous, and the plumage of the males is always beautiful, and in some cases exceedingly brilliant; the hens are much more soberly clad. The Common Pheasant (*Phasianus colchicus*)—the Phasian bird of the Latins—commemorates in its popular and scientific names the legend that it was brought to Europe in the Argo. We know from Martial that its flesh was highly prized and obtainable only by the wealthy. It was probably introduced into England before the Norman Conquest, and a licence of King John (1199) exists for "a free warren for hares, pheasants, and partridges." The pheasant is now fairly common in Europe, and in the British Isles is one of the most highly-prized game-birds, with a close time from February 1st to September 30th. In Great Britain it is rather half-domesticated than wild, for the eggs are often hatched under hens or in incubators, and the birds, young and old, regularly fed during the winter, the object being to raise a large head of game for battue-shooting. The young birds are chiefly fed on ants' eggs varied by artificial food, and the older ones on corn and green food, to which meat, raisins and potatoes are often added. When turned out, pheasants eat berries, grain, seeds, bulbs and insects. The male bird is about three feet long, of which the tail counts for about a half; the head and neck are steel-blue, with metallic reflections; the general plumage is orange-red and shades of brown with purplish-black markings; the tail is greenish-yellow barred with black, and with a dull red band on each side. The hen bird has a much shorter tail, and brown plumage with darker markings, washed on the neck with red and green. Old hens, however, sometimes assume the brilliant dress of their mates; when this is the case there is generally disease of the ovaries, which renders them incapable

of laying, though it is said that a hen-bird at Oulton Park which had assumed male plumage, laid a nest full of eggs and hatched them, but the young birds soon died. Pied and white varieties occur; and hybrids with other game-birds are by no means rare. They are frequently recorded in *The Field*, and often exhibited at meetings of the Zoological Society in London. The general weight of a cock pheasant is about 2½ lbs., but Yarrell records the occurrence of two that turned the scale at nearly double that weight. The Ringed Pheasant (*P. torquatus*), a native of India and China, somewhat smaller than the Common Pheasant, with which it breeds freely, has a white ring round the neck. It also is partially domesticated, and is, in some places, nearly as common as the older form. There are several other species of the genus, many of which are kept as ornamental birds. The Golden Pheasant (*P. pictus* = *Thaumalia picta*) has reddish



PHEASANT (*Phasianus colchicus*).

plumage, and a magnificent gold ruff barred with black. The Silver Pheasant (*P. nycthemerus* = *Thaumalia nycthemera*) is white above, with delicate black pencillings, and purplish-black below. Both have been introduced into British preserves, and in some cases the latter bird has driven out the native species. They may also be seen in aviaries in public parks and elsewhere. In Reeves's Pheasant (*P. reevesii*), with white plumage, the tail often measures over five feet in length. The Eared Pheasants, in which there is a tuft of feathers on each side of the head, belong to the genus *Crossoptilon*, and the Peacock Pheasants, with ocellated plumage, to the genus *Polyplectron*. [ARGUS, IMPEYAN PHEASANT.]

Pheidias, the greatest of sculptors, was born at Athens, Greece, about 500 B.C. His friend Pericles placed under his direction the enrichment of the city with temples and other new buildings, entrusting him at the same time with the execution of the more important details. The most famous of these buildings was the Parthenon, which contained a colossal statue of Athena carved by Pheidias himself. Portions of the metopes, frieze and pediments known as the Elgin Marbles (because they were sent over by Lord Elgin, the British Ambassador at Athens, at various times early in the 19th century and purchased in 1816 by the Government for £35,000) are now in the British Museum. The statue of Zeus in the

Olympieum at Olympia was held to be his masterpiece. According to Plutarch, Pheidias was charged with impiety because he had introduced his own portrait and that of Pericles on the shield of Athena, and thrown into prison, where he died about 432 B.C.

Phelps, ELIZABETH STUART, novelist, was born at Andover, Massachusetts, on August 31st, 1844. Her earliest serious work, *The Gates Ajar* (1868), attained great popularity because of its fresh views of the future state. This was followed by a large number of books chiefly written for the young. Amongst her works may be mentioned *Men, Women, and Ghosts* (1869), *The Trotty Book* (1869), *Poetic Studies* (1875), *Scaled Orders* (1879), *Doctor Zay* (1882), in which the question of professional careers for women is dealt with, and *Beyond the Gates* (1883), in which she harked back to the theme of her older book. In 1888 she married the Rev. Herbert Dickinson Ward, with whom she collaborated in *Come Forth* (1890) and *A Lost Hero* (1902).

Phelps, SAMUEL, actor, was born at Devonport, England, on February 13th, 1804, and educated in his native town and at Saltash. He first tried his hand at journalism, but feeling a vocation for the stage turned actor in 1826 and, during the next eleven years, played many parts throughout England and Scotland. After a few performances at the Haymarket in 1837, he began his connection with Macready in the same year, making his *début* at Covent Garden as "Jaffier" in *Venice Preserved* on October 27th. He often alternated the parts of "Othello" and "Iago" with Macready and, in the former, was considered superior to the more famous tragedian. In 1844 he undertook a prominent part in the management of Sadler's Wells Theatre, being thus the first actor-manager, and throughout the next eighteen years presented Shakespeare and the other classic dramatists in a manner hitherto unsurpassed as regards both acting and mounting. He often appeared at Drury Lane in his later career, and created a genuine surprise by doubling the parts of "King James VI." and "Trapbois the Miser," in Andrew Halliday's adaptation of *The Fortunes of Nigel*. Phelps died at Coopersale, near Epping, on November 6th, 1878. His most masterly performance was "Sir Pertinax Macsycophant" in *The Man of the World*, and he was excellent in heroic parts, in Scottish characters, and in parts—like "Bottom," "Shallow," "Malvolio," and "Falstaff"—where broad humour or comedy was predominant.

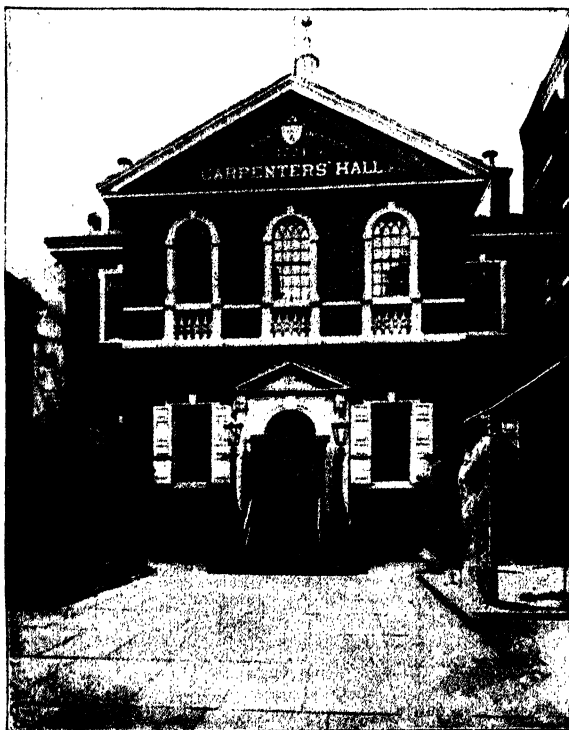
Phenols are a class of compounds obtained from benzene and its derivatives by the substitution of one or more hydrogen atoms of the benzene ring [BENZENE] by hydroxyl (HO) groups. According to the number of hydrogen atoms so replaced, we obtain mono-, di-, or tri-hydric phenols; common examples of which are carboic acid, hydroquinone, and pyrogallic acid respectively. Although analogous to alcohols to some extent, they differ from these compounds in possessing acidic properties. They may be prepared by a number of general

syntheses, and include very many of both chemically and technically important compounds.

Phi Beta Kappa, the oldest American college Greek letter society, founded in 1776 in the Raleigh Tavern at Williamsburgh, Virginia, by forty-four undergraduates of William and Mary College. Branches were afterwards established at Yale and Harvard and in the principal colleges and universities of the United States. Its name is said to be derived from the initial letters of its motto *Philosophia Bina Kubernetes* ("Philosophy the governor of life"). The society was "founded on literary principles," and intended to embrace the "wise and virtuous of every degree and of whatever country." Since 1831 its mysteries have ceased to be secret and it is now only "an agreeable bond of meeting among graduates." An annual dinner is held at Harvard with an oration and a special poem.

Philadelphia, the third city of the United States and capital of Pennsylvania, on the left bank of the Delaware (upon which it has a frontage of 23 miles), and 85 miles S.W. of New York. The old city was small in area and situated between the Delaware and its tributary the Schuylkill; but now many surrounding towns, which still retain their old names, are included, the main roads to these towns being avenues within the city. The streets are for the most part at right angles to the Delaware, with intersecting streets, and are often lined with trees. Household life has been developed to an extraordinary degree and, in consequence of the great number of its dwellings (probably 300,000), Philadelphia has been called the "city of homes." Of the principal streets, Broad Street, running north and south, is 6 miles long and 113 feet wide; and Market Street, with an east and west direction, is 4 miles long and 100 feet wide. There are many squares, ornamented with trees and fountains, and ferries connect the city with New Jersey. The bridges are handsome; and there is an Old Hall, in which the Declaration of Independence was adopted in 1776, and a City Hall with a lofty tower (547 feet high) surmounted by a 36-ft. statue of Penn. Other buildings are the Custom-house, United States Mint, United States Arsenal, post-office, Carpenters' Hall, where the first Continental Congress met (1774), the splendid Masonic Temple, and several important educational and charitable institutions of which the more influential are Pennsylvania University (founded in 1740), Jefferson Medical College, the Drexel Institute, the Williamson Technical School, Girard College, Pennsylvania Academy of the Fine Arts, Academy of Natural Sciences, Commercial Museum and the Philadelphia Library,

and several hospitals and learned societies. The city is a leading art centre, and contains some fine pictures. Fairmount Park, of 2,740 acres, is well-wooded and diversified. The city, being open to vessels, a railway centre, and in close connection with the coal-fields, has a large foreign, inland, and export trade. The chief objects of manufacture are woollen and cotton goods, especially carpets; locomotives, machinery, foundry and machine-shop products; sugar, tobacco, petroleum, upholstery goods, iron and steel products; while there are many breweries and chemical works. Philadelphia was founded by Penn in 1682, and the next year it received a colony of Friends from Germany, Holland and Great Britain. It played a foremost



CARPENTERS' HALL, PHILADELPHIA.

(Photo: Cassell & Co.)

part in the Revolutionary war, was the meeting-place of Congress during the major part of the struggle, was occupied by the British from September, 1777, to June, 1778, and was the seat of the United States Government from 1790 to 1800. Benjamin Franklin made the city his home from 1723 to 1790. In 1876 the Centennial Exhibition was held in Fairmount Park, the Memorial Hall and Horticultural Hall being souvenirs of the event. Pop. (1700), 4,500; (1800), 41,220; (1900), 1,293,697.

Philadelphia. [ALA-SHEHR.]

Phila., a small island in the Nile, on the confines of Egypt and Nubia, above the First Cataract, 4 miles S.S.W. of Assuan. It contains many memorials of ancient Egypt, among which are the ruins of eight temples of different dates and



RUINS AT PHILAE.

religions, an avenue of columns, obelisks, a Roman triumphal arch, etc. The worship of Isis prevailed far into the Christian era. Since the construction of the great dam at Assuan the island is frequently submerged, but the ruins escape the flood.

Philately is the name generally given to the science or pseudo-science that treats of the collection of postage and revenue stamps and the study of the details of their history, manufacture, &c. The word has gradually replaced the older and simpler term Stamp Collecting, since the present-day collector is seldom satisfied with the mere accumulation of a number of specimens, but wishes to know all that he possibly can about them. The hobby is of comparatively recent date, the earliest collections, in the accepted sense of the word, having been made about the middle 'fifties of the last century, though it is said that a certain Government official formed a collection of revenue stamps long before that time. However, in spite of its comparative youth, one would probably be justified in assuming, from the number of books and periodicals devoted to the subject, that Philately claims

more adherents than do all the other collecting hobbies combined. The word was originally coined in Paris in the early 'sixties to replace such terms as the more cumbersome *timbologie*, and the unpleasantly suggestive *timbromanie*. It is said to be derived from the Greek *philos*, "loving," and *ateles*, "free of tax," i.e., "prepaid." Another meaning of the latter Greek word is "without end," from which one might call the philatelist the devotee to a hobby, the pleasure or the labour of which never ceases. Though the term, strictly speaking, covers the study of fiscal as well as postage stamps, the collection of the first-named is generally regarded as a special hobby, and attracts comparatively few people. The same may be said with regard to non-adhesive postage stamps, such as envelopes, postcards and wrappers, which, being usually collected entire or cut square, have never been very popular by reason of their comparative bulkiness and the consequent difficulty of satisfactory arrangement.

The first adhesive postage stamp, the "black penny Queen's head," was issued to the British public on May 6th, 1840, together with the "Mulready" envelopes of the values of one penny and twopence. The extraordinary designs of the latter aroused considerable amusement and ridicule, and they were never much used by the public. In 1842 a New York local post issued a stamp, and several other American cities followed suit, though it was not till 1847 that stamps were officially provided by the United States Government itself. Meanwhile, in 1843, two Swiss cantons and the Empire of Brazil had adopted the new device for prepaying postage. Mauritius (in 1847) was the first British colony to have postage stamps. France and Belgium joined the list of stamp-issuing countries in 1849, and within a very few years every civilised country had its own postage stamps.

Philately proper may be said to date from the issue of the first printed catalogue of stamps, which took place in Paris in December, 1861, and was followed in the ensuing year by two English ones. In September, 1862, the first English stamp magazine, the *Monthly Intelligencer*, appeared in Birmingham, and the same year saw the issue of the first planned stamp album. This was a French production, and though the United Kingdom may claim to have originated the adhesive postage stamp, it must be owned that the French were in more ways than one the pioneers of the scientific philately of the present day. The earlier collectors paid no attention to minor differences, and it was only by slow degrees that they began to investigate such matters as the methods by which the stamp had been printed or separated from the sheet, the presence or absence of watermarks, the kind of paper on which it was printed, etc., etc. In 1865 the first philatelic society was established in Paris, but had only a short period of existence. The London Philatelic Society, for which is claimed the rank of the premier one of the world, was founded in 1869. In 1906 it had for its President the Prince of Wales, who is far from being merely a figurehead, since he has not only frequently exhibited portions of his collection, but has several

S. S. ALA-SHEHR.

times contributed information on matters connected with the Society's work. In the middle 'seventies things philatelic were in a bad way, and the two leading English periodicals ceased to appear. This period of depression soon passed, and from about 1877 to the present day nothing but steady progress has to be chronicled. Popular interest in the hobby has been greatly stimulated by the holding of public exhibitions, the first of which took place at Antwerp, in 1887. Since then they have become practically annual affairs. Furthermore, the numerous stamp auctions which are of almost daily occurrence in London from about the middle of October till the middle of June, and take place at fairly frequent intervals in many other important cities, have done much to give popularity and stability to the pursuit.

Virtually everyone is interested in the question of the market values of stamps, since anybody may chance to become the possessor of an old collection or a bundle of old envelopes. General belief sets great store upon specimens of the triangular Cape of Good Hope stamps, and the "penny blacks" of Great Britain. As a matter of fact, however, a specimen of the former can be had for a shilling or two, while sixpence will procure one of the latter. But there are two triangular Cape of Good Hope stamps printed by error in wrong colours (the penny in blue and the fourpence in red instead of *vice versa*) which fetch more than £50 each when used, while their value in fine unused condition is nearly ten times that sum. Then, too, a variety of the "black penny" (intended for official use but never actually issued to the public, and differing from the common one only by having the letters V.R. in the upper corners) is worth between £5 and £10. So that after all there is some foundation for the belief above referred to. The rarest-known stamp in the world is the one cent of the 1856 issue of British Guiana, a plain type-set article printed in black on magenta-surfaced paper at the office of the *Official Gazette*, Georgetown, during a dearth of the ordinary British printed stamps. Of this but one specimen is known, which is in the collection of Herr P. von Ferrary of Paris. Its present cash value is highly problematical, for there are now so many wealthy philatelists that such a unique rarity might just as readily fetch thousands as hundreds of pounds. Better known as rarities are the first issue of Mauritius penny and twopence stamps, generally called, from the inscription on them, the "Post Office" varieties. Of each only 500 in all were printed, each one separately, only about a dozen of each value of which being now known. In 1894 an unused specimen of each value fetched £680 at auction. In 1903 a couple on the original envelope fetched £2,400. Even this is not the record, since a magnificent unused specimen of the twopence has since been sold at auction for no less than £1,450. It now adorns the collection of the Prince of Wales, by whom it was exhibited in the London Philatelic Exhibition of 1906. The first stamps of the Hawaiian Islands, known as "Missionaries," from the calling of those who issued them, are of the greatest rarity, and the two cents was sold some years since for £700. The rarest European

stamp is probably the 81 paras Moldavia of 1856, which has fetched £350 in unused condition. Among the stamps of Great Britain there is nothing so costly as this, but yet an unused specimen of the £1 brown lilac with anchor watermark, issued so lately as December, 1882, is worth about £100, and even when used fetches £3. Stamps worth from £50 upwards are fairly numerous, and the sale of them is often recorded in the papers during the auction season. Wherefore any non-philatelist finding or receiving a number of old stamps would do well to have them looked over for rarities by a philatelic friend, or, failing this, to submit them to one of the big firms of auctioneers who make a special feature of stamp sales, for an opinion as to the price likely to be realised.

The starting of a stamp collection is generally an easy matter. The commoner kinds can generally be begged from friends, or for a few shillings any stamp-dealer will supply a packet containing some hundreds of different varieties. There are dozens of stamp albums on the market at all prices, many containing illustrations which will help the novice in identifying his specimens. At the beginning the tyro should take the stamps of all countries, paying particular attention to the fineness and perfect condition of his specimens, and, as he makes progress with his hobby, he should closely examine his stamps for differences in the minor details of printing, watermark, perforation, paper, etc. In this he will derive much help from the illustrated price catalogues issued by some of the leading dealers and the numerous periodical and other works dealing with philatelic matters. Here, let it be said, the expenditure of a little money on philatelic literature is often most profitable, the knowledge thus obtained frequently resulting in the acquisition of rare varieties at merely nominal prices. After a while, the collector will probably find that for one reason or another he is most interested in the stamps of one particular country or group of countries. Since it is practically impossible to obtain anything like a complete or even a good all-round collection unless through the expenditure of vast sums, he will now find it advisable to devote his attention solely, or almost solely, to his favourites, thus becoming what is called a "specialist." Continuing his career, he will probably join one or more of the many philatelic societies abounding all over the world, and as his collection increases, he will exhibit it at meetings of these societies or even at competitive exhibitions, besides writing papers on his special branches, thus becoming a man of light and leading in the philatelic world.

Philemon, EPISTLE TO, is supposed to have been written by St. Paul, either—and most probably—during his first imprisonment at Rome or during his imprisonment at Cæsarea. The purport of the letter is an appeal to Philemon—a wealthy convert at Colossæ—on behalf of Onesimus, once his slave, who had run away from his service and, ultimately finding his way to Rome, had been persuaded by Paul to be a Christian. It is valuable as showing the attitude of early Christianity towards the slavery question. Its authenticity has

seldom been impeached and, judging it from internal evidence, Renan was unusually emphatic: "Few pages," he wrote, "have so true an accent. Paul alone could have written this little masterpiece." It is interesting to note that, according to tradition, Philemon was stoned to death in Nero's reign, and among those who suffered martyrdom with him was this very Onesimus.

Philemon and Baucis, in the Greek myth, were an aged couple who entertained Zeus and Hermes when, travelling through Phrygia in human shape, they were denied admittance by all the other inhabitants. As a reward for their hospitality, their cottage was converted into a temple, in which they passed the remainder of their lives as priest and priestess, dying at exactly the same moment.

Philip, one of the Twelve Apostles. He belonged to Bethsaida of Galilee, was the fourth to enrol himself among the followers of Jesus, and the first who was directly called (St. John, i. 43). It is supposed that, along with Andrew and Peter, he had been a disciple of the Baptist, since his call took place near "Bethany beyond Jordan, where John was baptising." Later in life he appears to have been engaged in missionary labours in Asia Minor, and to have settled at Hierapolis where, about the age of ninety, he was buried along with two aged virgin daughters. Traditions vary as to the circumstances of his death. According to some accounts he died a natural death, but certain other versions say he was martyred.

Philip, the Evangelist, was, according to tradition, a native of Cæsarea, on the coast of Palestine. He was one of the seven "managers" selected by the young Christian community to attend to the charitable relief of the widows and poor (Acts, vi. 1-6). He chose missionary work among the Gentiles as his sphere of activity. He laboured with great acceptance among the Samaritans either at Samaria or Sychem, and won them from Simon Magus to Christ. Philip was also instrumental in baptising the Ethiopian eunuch whom he met on the road between Jerusalem and Gaza (Acts, viii. 26-39). After the outbreak of the war that culminated in the fall of Jerusalem, Philip probably left Palestine and (it is conjectured) settled in Asia Minor, probably at Tralles, where he died a natural death.

Philip II., King of Macedonia, was the son of Amyntas II., and was born at Pella in 382 B.C. He was educated at Thebes. On the death of his brother Perdiccas III. he became guardian to his nephew Amyntas, but he soon afterwards established himself as king (360). After securing peace within his borders and bringing his army to a high state of efficiency, he set to work to enlarge his dominions. His projects were too vast to be accomplished in a lifetime; yet his tact, his dogged resolution, and his utter unscrupulousness as to the means he employed enabled him to make great headway in their realisation. After subduing the Greek towns on the shores of the Ægean, he advanced

through Thessaly as far as Thermopylæ; but, finding the pass well defended by the Athenians, he was compelled to retrace his steps (352). He now engaged in a war with Thrace, and in 347 completed his conquest of Chalcidice by taking the town of Olynthus. An appeal from the Thebans for aid against the Phocians, their adversaries in the Sacred War, gave him the opportunity of interfering in the affairs of Hellas (346). The Phocians were conquered by a Macedonian army, and during the ensuing years Philip made such good use of the position he had thus gained that in 338 he became commander of the forces of the Amphictyonic Council. In this capacity he set out for Greece in order to make war on the Locrians of Amphissa. The Athenians, perceiving too late the danger which threatened themselves and their neighbours, united with the Thebans to resist his progress, but their forces were completely routed at the battle of Chæronea (338). Master of all Greece, Philip now directed his thoughts to the other side of the Ægean. He was about to start on an expedition against Persia, when he was assassinated at the marriage of his daughter with Alexander of Epirus (336).

Philip II., or PHILIP AUGUSTUS, King of France, was born in Paris on August 21st, 1165, and succeeded his father Louis VII., in 1180. He started with Richard I. on the Third Crusade (1190), and remained with him during the winter in Sicily, but returned to France soon after his arrival in Syria. Bent on regaining the English possessions in France, he seized every opportunity of hampering the reigning king, encouraging the sons of Henry II. to rebel against their father, intriguing with John against Richard during the latter's absence in Palestine, and supporting the claims of Arthur of Brittany against those of John. The disturbed state of England in 1204 enabled him to lay hands on Normandy, Maine, Anjou, Touraine, and part of Poitou, his pretext being that John had not fulfilled the duties of a feudal vassal. In 1214 he gained a great victory at Bouvines over Otto IV. and the Count of Flanders. He died at Mantes on July 14th, 1223. The reign of Philip Augustus marks a distinct step forward in the consolidation of the French monarchy.

Philip IV., le Bel ("The Fair"), King of France, was born at Fontainebleau in 1268, and succeeded his father, Philip III., in 1285. The chief incident in his reign was his quarrel with Pope Boniface VIII., who denied his right to raise taxes from the clergy. Boniface died in 1303, and in 1305 Philip secured the election of Bertrand de Got (Clement V.) to the Papacy. The removal of the Papal throne to Avignon four years later brought the head of the Church still more thoroughly under French influence. The persecution of the Knights Templars (1310-14), on mysterious charges of heresy and immorality, led to the complete extermination of the Order in France. Philip died at Fontainebleau on November 29th, 1314.

Philip VI., of Valois, King of France, the son of Charles of Valois, brother of Philip IV., was

born in 1293, and became king after the death of his cousin Charles IV. in 1328. Edward III. of England claimed the throne through his mother Isabella, daughter of Philip IV.; and this dispute, together with more substantial causes of quarrel, plunged the two countries in the Hundred Years' War, which broke out in 1337 and one of the conspicuous conflicts in which was fought at Crecy on August 26th, 1346, when the French were completely defeated. In the midst of the distress caused by war and pestilence, Philip did not scruple to burden his subjects with extortionate taxes. He died at Nogent-le-Roi, near Chartres, on August 22nd, 1350.

Philip II., King of Spain, son of the Emperor Charles V. and Isabella of Portugal, was born at Valladolid on May 21st, 1527. His natural tendencies, the outcome of a cold and sullen disposition, were confirmed by the training he received from his ecclesiastical instructors. It was his fixed resolve to make his power absolute throughout all the dominions to which he was heir; and, without any genuine reverence for religion or virtue, he was ready on the first occasion to show himself a religious persecutor. His wife, Mary of Portugal, died in 1545, after giving birth to the ill-starred Don Carlos. From 1548 to 1551 he resided in the Netherlands, where he made himself extremely unpopular. In 1554 his father sent him to England to wed Queen Mary, presenting him at the same time with the kingdom of Naples and Sicily. Disappointed in his wife, who proved to be barren, and unsuccessful in his efforts to win the favour of the people, he remained in England little more than a year. The abdication of Charles V. in 1556 made him ruler over Spain, the two Sicilies, the Duchy of Milan, the Netherlands, Franche Comté, Mexico and Peru, besides colonies along the African coast and in the East and West Indies. A war against Henry II. of France, who was supported by Pope Paul IV., was terminated by the treaty of Cateau Cambrésis (1559), restoring to Spain all the territory which had been won from Charles V. Negotiations for a marriage with the English queen Elizabeth having failed, he in 1559 espoused Isabella of France, thereby strengthening his alliance with that kingdom. Returning to Spain at the close of that year, he proceeded to carry out the policy to which he always adhered, stamping out every vestige of political liberty, and enforcing allegiance to the Church through the terrors of the Inquisition. His zeal on behalf of religion enabled him to take the place of the Pope as leader of the Catholic party in Europe. His methods were more congenial to his own subjects than they were to the Netherlands, who rose in a revolt which led to the formation of the Dutch Republic. [HOLLAND.] On the death of Henry of Portugal in 1580, Philip took possession of the kingdom, which he claimed through his mother. His expedition against England (1588) ended in utter failure [ARMADA], and his French intrigues were brought to naught by the conversion of Henry of Navarre to the Roman Catholic religion (1593). Worn out by excessive toil and harassed by re-

peated failures, he fell a prey to a disease brought on by his debaucheries, and died at the Escorial on September 13th, 1598, leaving as his heir PHILIP III. (1578-1621), son of his fourth wife, Anne of Austria, whom he had married in 1570.

Philip IV., King of Spain, was born at Valladolid on April 8th, 1605, and succeeded his father, Philip III., in 1621. His reign was characterised by warfare in most of the countries of mid-Europe, in consequence of the arbitrary and exacting policy of Olivarez, his Prime Minister. In the north of Italy there were years of continuous strife following the massacre of the Protestants in Valtellina; Spanish supremacy was



PHILIP IV.

From the painting by Velasquez in the Dulwich Picture Gallery, London.)

menaced in south Flanders; Germany was seething with discontent. But the peace of Westphalia (1648) brought some relief, though it cost Spain the Low Countries. The peace of the Pyrenees (1659) also proved an expensive anodyne, for Roussillon, Artois, and other small territories were handed over to France. The Portuguese, also, were growing restive under Castilian rule, and there were serious revolts in Catalonia. Apart from public affairs, Philip was a warm patron of art and letters and, through the many masterly canvases of Velasquez, his features are better known to us than those of any other monarch before the era of photography. He married Elizabeth of Bourbon in 1615, and Maria Anne of Austria in 1649. His daughter, Maria Theres, married Louis XIV. of France. Philip died at Madrid on September 17th, 1665.

Philip V., King of Spain, son of Louis, Dauphin of France, and grandson of Louis XIV., was born at Versailles on December 19th, 1683. His claim to the Spanish throne was based on the will of Charles II. When he left France, where he bore the title of Duke of Anjou, his grandfather parted from him with the cynical remark, "*Mon fils, il n'y a plus de Pyrénées!*" He took up his abode at Madrid early in 1701, but a rival claimant appeared in the person of the Archduke Charles of Austria, and the states of Europe were drawn into the War of the Spanish Succession, which was terminated in Philip's favour by the treaties of Utrecht (1713) with England, Holland and Portugal, and of Rastadt (1714) with Austria. Under these instruments Spain lost Flanders, Luxemburg, Milan, Naples and Sardinia; Gibraltar and Minorca, which had been annexed by Great Britain; and Sicily, which was ceded to the house of Savoy. Shortly after the death (1714) of his queen, Maria Louisa, whom he had married twelve years before, Philip came under the influence of Alberoni. He married Elizabeth Farnese in the same year, and she, along with the Italian minister, completely dominated the king. Although Alberoni fell (1719), Philip passed into a condition of deep melancholy, and abdicated in favour of his son, Don Louis (1724). The new king survived only a few months, and, there being no successor of age, Philip was forced to resume power in spite of himself. He died at Madrid on July 9th, 1746.

Philip the Bold, Duke of Burgundy, son of John, King of France, was born on January 15th, 1342. He behaved with great gallantry at Poitiers (1356), thereby gaining his nickname of "Le Hardi," and accompanied his father in his captivity in England. On his return to France he was created Count of Touraine (1360). He was granted the duchy of Burgundy and made the premier peer of France in 1363. In 1369 he married Margaret, daughter of the Count of Flanders, and on her father's death (1384) became ruler over Flanders, the county of Burgundy, Artois, Rethel, and Nevers. His dominions prospered greatly under his enlightened government. He acted as regent of France during the mental incapacity of Charles VI. He died at Hall, in Hainault, on April 27th, 1404.

Philip the Good ("Le Bon"), Duke of Burgundy, was born at Dijon on June 13th, 1396. He was the grandson of Philip the Bold and son of John the Fearless, whom he succeeded after his assassination in 1419. He allied himself with Henry V. of England, was one of the parties to the Treaty of Troyes (1420), and contributed in no small degree to the success of the English arms in France during the ensuing years. In 1435, however, he became reconciled with Charles VII., an event which was soon followed by the expulsion of the English from France. He died at Bruges on July 15th, 1467.

Philip Neri. [NERI, ST. FILIPPO DI.]

Philippi, a town of Macedonia (modern Rumelia) on the Angista, 12 miles from the

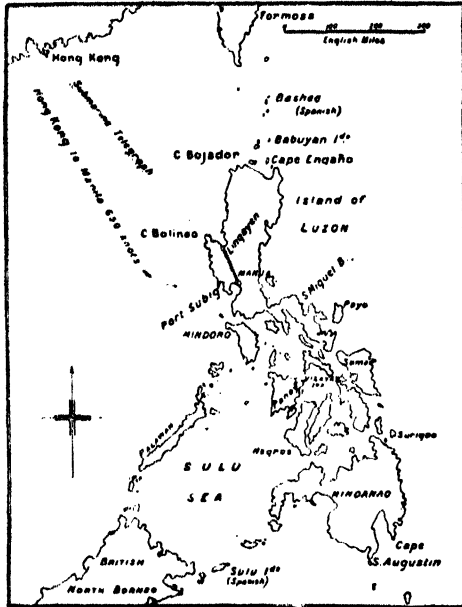
Egean Sea. It was originally called Crenides, but took the present name from Philip of Macedon, who fortified the town as an outlier of his empire. Octavian (afterwards the Emperor Augustus) and Antony defeated Brutus and Cassius in 42 B.C. in the plains, a victory which eventuated in the collapse of the Roman republic. It was here, about A.D. 52, that Paul was "shamefully entreated" during his second missionary tour, and released from prison, along with Silas, after the midnight earthquake, and it was to the Christian community here that he addressed his Epistle.

Philippians, EPISTLE TO THE. The church at Philippi was the first founded in Europe by Paul (about 52). It prospered and was well organised, and there seems to have been warm regard between the Christians and the apostle, who visited it on two or three occasions. The letter was written from Rome, where Paul was captive, in acknowledgment of gifts sent through Epaphroditus by the Philippians to relieve his personal wants. The date of the Epistle cannot be definitely fixed owing to the fluctuations of the Pauline chronology, but it was between 57 and 59, or 59 and 61, or 62 and 61. It was probably the last of the Epistles of the closing period of the captivity. The majority of the commentators accept it as authentic.

Philippics, the series of the greatest orations delivered by Demosthenes, in 351 B.C., against Philip of Macedon (hence their name), whose aggrandising policy menaced the liberties of Athens. The orator tried to arouse the citizens to a knowledge of the jeopardy in which they stood and to stimulate them to a higher and keener sense of public spirit. By analogy (real or fancied) of circumstances Cicero's speeches against Mark Antony have also been described as "philippics." The transition to a still more general usage was easy, and the word came to be employed to designate any spoken (or even written) invective in which the indignation took an acrimonious and violent character.

Philippine Islands, a Pacific group, N.E. of Borneo, E. of the China Sea, and N. of the Sea of Celebes, constituting a possession of the United States. They lie between 4° 40' and 21° 10' N. and 116° 40' and 126° 34' E., and comprise over three thousand named and nameless islands and islets. The chief are Luzon, Mindanao, Palawan, Mindoro, Panay, Negros, Cebu, Bohol, Leyte, Samar and Masbate, and they occupy an area of 115,000 square miles. They are mostly of volcanic formation. The highest points are Apo (10,311 feet) in Mindanao, Halcón in Mindoro (8,865), Mayon (8,234) and several peaks of the Carraballos ranges (4,000 to 8,200) in Luzon. The rivers include the Cagayan, Agno Grande, Abra, Pampanga and others in Luzon, and the Agusan and Pampanga in Mindanao. The principal lakes are Laguna de Bay, Taal, Candava and Bato in Luzon, and Lanao, Bulnan and others in Mindanao. Many of the islands contain capacious natural harbours. In the west rain prevails from June to September, and then the rain shifts to the east. The rains cause

temporary lakes, from which the heat raises much moisture, and the climate is tempered by land and sea breezes. The islands are subject to earthquakes. The chief minerals are gold, silver, iron, copper, lead, sulphur, coal and marble. There is much large timber, and rice, millet, maize, cacao, sago, Manila hemp, pine-apple, cocoa-palm, cotton, dye-woods, rubber, coffee, sugar, indigo, tobacco, tamarind, betel, cinnamon, bananas and various other fruits are cultivated. The buffalo—used in agriculture—and cattle are also found wild, and there are horses, deer, hogs, goats, sheep, monkeys, abundant game, birds, crocodiles, tortoises, snakes, fishes, etc. The sea-swallows' nests are largely



SKETCH MAP OF THE PHILIPPINE ISLANDS.

exported to China for food. Pearls and holothurians are also fished for. The manufactures comprise tobacco, hemp, sugar, copra (the dried kernel of the coco-nut), liquors, rope and cordage, textiles, hats and straw goods, in addition to shipbuilding, printing and weaving. Besides the wild tribes, such as the Negritos, who inhabit Negros chiefly and resemble the Dyaks, there are the more civilised Spanish Christian subjects, who are called Tagals in Luzon and Visayas elsewhere, and many Chinese and half-castes. The islands were discovered by Magellan in 1521. For two generations the Spaniards took little interest in them, but in 1571 Manila was chosen as capital of the group and before the end of the 16th century dominion was complete. Troubles with the natives, visitations of hurricane and earthquake, and piratic attacks were the principal difficulties the Spaniards had to contend with until the war with the United

States (1898), as the result of which the islands were ceded to the United States (by the treaty of Paris, December 10th, 1898), the Americans paying £4,000,000 by way of compensation. Next year the Filipinos under Aguinaldo rose against their new masters and carried on a guerilla warfare till 1901 when their leader was captured. In 1902 civil government was established. Manila, on the west coast of Luzon, remained the capital. Pop. (1901) estimated, 7,000,000 (including 25,000 foreign-born and 100,000 Chinese).

Philippopolis, a town of Eastern Rumelia, Bulgaria, on the Maritza, about 100 miles W.N.W. of Adrianople. It was founded by Philip of Macedonia and under the Romans became the capital of Thrace. The Goths nearly exterminated the inhabitants in the 6th century and the Turks acquired it in the 14th. It was overthrown by earthquake in 1818, burned down in 1846 and witnessed a defeat of the Turkish army by Russia in 1878, but is now a flourishing and attractive town, with manufactures of textiles, tobacco, leather, and attar of roses. Pop. (1901), 42,859.

Philips, AMBROSE, poet, was born, about 1675, of a good family in Leicestershire, and educated at St. John's College, Cambridge. On coming to London he became the friend of Joseph Addison and Richard Steele, and a leading figure at Button's coffee-house. He worked for Tonson, whose *Miscellany* (1709) opens with six *Pastorals* containing some of his most vigorous and elegant verses. In 1713 he had a quarrel with Alexander Pope, whom he threatened to cane, and who replied with savage passages in his *Satires*. Philips was always a consistent Whig. His contributions to the *Free-thinker* (which he started in 1718) were rewarded by the Government with the post of secretary to Archbishop Boulter in Ireland, where he eventually became judge of the Prerogative Court (1733). He died in London on June 18th, 1749.

Philips, JOHN, poet, was born at Bampton, Oxfordshire, on December 30th, 1676, and educated at Winchester and Christ Church, Oxford. His poetic gifts were early in evidence, though he was reluctant to publish. However, the appearance of a surreptitious version led him to issue in 1705 a correct edition of his *Splendid Shilling*, a burlesque imitation of John Milton. He was invited to write a Tory counterblast to Joseph Addison's *Campaign*, and this resulted in *Blenheim* (1705). In 1708 appeared his *Cyder*, a poem on the culture of the apple-tree and the manufacture of cider. Meanwhile his health had given way, and he died at Hereford of consumption on February 15th, 1709.

Philistines—i.e., inhabitants of Palestine—a race who in the period of the Hebrew kings occupied the low country along the coast of Palestine. They appear to have been originally wandering emigrants, and have been thought by some to be identical with the Hyksos who invaded Egypt. Opinion is divided, however, upon the question of their native home, though it is generally agreed that they came from the Nile Delta, or Cyprus, or Crete. In the time of Abraham they were a

pastoral people, but developed commerce and became powerful, their military prowess especially being remarkable. Their five cities of Gaza, Ashkelon, Ashdod, Gath and Ekron gave the Israelites much trouble; and in the time of the Judges the Philistines evidently had the upper hand, as is shown by their frequent raids. This seems to have been one of the chief reasons for which the Israelites demanded a king; and Saul and David effectually put them down. They became again independent after the Separation, and harassed the kingdom of Israel. Later we find them invading Jerusalem, and still later they were merged in the Assyrian Empire. Their language was probably Semitic, and they appear to have had a considerable coasting and inland traffic. Their chief gods were Dagon, Ashtaroth, and the fish-deity Derceto. The term "Philistine" is also commonly used to express (with a *souppçon* of humour) an unfeeling foe, such as a tax-collector or policeman, and also a commonplace, self-satisfied person puffed up with his own conceit and ignorance. "The people," wrote Matthew Arnold in *Sweetness and Light* (§ 13), "who believe most that our greatness and welfare are proved by our being very rich, and who most give their lives and thoughts to becoming rich, are just the very people whom we call Philistines."

Phillip, JOHN, painter, was born in Aberdeen, Scotland, on April 19th, 1817. His love of drawing was innate and to a large extent he was artistically self-educated, while serving his apprenticeship to a local house-painter and glazier. Under the auspices of Lord Panmure, who had become interested in examples of his early skill, he was enabled to attend the Royal Academy Schools, London, in 1837. He began to exhibit shortly afterwards, his first works plainly showing the influence of Sir David Wilkie. Wintering in Seville (1851-2) for his health's sake, he struck out on a line of his own in which he proved complete mastery of technique, colour, composition and feeling. Among his best pictures are "The Letter-writer of Seville" (1854), which was commissioned by Queen Victoria, "The Prison Window" (1857), "The Marriage of the Princess Royal" (1858), an unusually successful example of a ceremonial painting, "A Huff" (1859), "La Gloria" (1864), his masterpiece, "The House of Commons, 1860, during the Debate on the French Treaty" (1863) and "The Early Career of Murillo" (1865). Phillip became A.R.A. in 1857, and a full member in 1859. He was also a forcible and telling painter of portraits. He died in London on February 27th, 1867.

Phillips, EDWARD, author, was born in August, 1630, in London, the son of Ann, only sister of Milton, and of Edward Phillips, who held an office in the Court of Chancery. The father died in 1631 leaving his two boys to be brought up by the poet. When Milton, aged thirty-one, returned from Italy in 1639, Edward went daily to his lodgings in St. Bride's Churchyard, Fleet Street, to be taught. In 1640 the poet removed to "a pretty garden-house" in Aldersgate Street, and here both the

nephews found a home. Milton married in 1643, but after a few weeks his wife went back to her friends, and his father, a Puritan and an accomplished musician, joined the household. Additional pupils shared in the studies of the young Phillips, and from Edward's account of his uncle's method we learn that, added to Greek, Latin, French and Italian, were Hebrew, Chaldee and Syriac. On Sundays there were expositions of the Greek Testament and dictation in Latin of a System of Divinity. Edward went to Oxford in 1650, entering Magdalen College, but left in the following year without taking a degree and sought for work from the booksellers. He maintained an affectionate intercourse with the poet until his death. He often visited him and read *Paradise Lost* as it was composed. In 1663 he became tutor, at £20 a year, to the son of John Evelyn, who tells us in his Diary he was "not at all infected by Milton's principles," and describes him as "a little versatile in his studies, understanding many languages, especially the modern." He afterwards became tutor to the son of the Earl of Pembroke. Aubrey says Milton made his nephews songsters. Edward's first publication was a poem prefixed to Henry Lawes' *Ayres and Dialogues for One, Two, and Three Voices* (1653). He published two novels in 1656, and, in the same year, the first complete edition of the *Poems of Drammond of Hawthornden*, to which he added a preface and some commendatory verses. After long preparation his *New World of Words* appeared in 1658, a dictionary of "hard English words" compiled with the assistance of other writers, of which several subsequent editions were issued. In 1658 his *Mysteries of Love and Eloquence* addressed "To the Youthful Gentry" was also published. Entertaining and licentious, it is a revolt from his uncle's training. His later writings were of a serious nature. In his *Theatrum Poetarum*, an index of the poets of all countries with occasional criticism, 1675, the year after Milton's death, his uncle is praised as "the exactest of Heroic Poets." He married late in life, "lived in poor condition and wrote several things to get a bare livelihood." He is thought to have died at about the age of sixty-seven, some time after the publication, in 1694, of his most valuable work, his short Memoir of Milton prefixed to his translation of the poet's *Letters of State*, which Johnson describes as "the only authentic account of Milton's domestic manners."

Phillips, JOHN, author, the posthumous son of Edward Phillips the elder and Milton's godson, was born in 1631, and was entirely maintained and educated by his uncle, whose assistant he became. Gifted with greater talents than his brother Edward he ungraciously displayed bitter opposition to his benefactor's discipline and views. His *Satyr against Hypocrites*, 1655, is a coarse attack on Puritanism, and its success must have proved a great disappointment to Milton, who happily died before it was published, in 1700, as *Mr. John Milton's Satyre*. Still more licentious was his *Sportive Wit*, which was burnt by order, and Phillips promptly supplied its place by a similar

volume, *Wit and Drollery*, 1656. His *Montelion, 1660*; or the *Prophetical Almanack*, was another offensive and successful work. Henceforth he saw but little of his uncle, and became an industrious hack-writer. For the disreputable Titus Oates he wrote, 1680, *Dr. Oates's Narrative of the Popish Plot Vindicated*. His *Modern History, or a Monthly Account of all Considerable Occurrences, Civil, Ecclesiastical and Military*, 1688, is interesting as one of the earliest works published in serial parts at sixpence. A man of loose principles, atheistical, having left his wife and family uncared for, a martyr to gout, he died in 1706.

Phillips, STEPHEN, poet, was born at Somerton, Oxfordshire, in 1868, and educated at the grammar schools of Stratford-on-Avon and Peterborough. He studied for the Civil Service, but abandoned this for the stage, touring with Mr. Frank R. Benson and appearing in all manner of parts. He then became an army tutor and ultimately took to literature. As a poet he compelled attention from the first, his *Christ in Hades* (1896) being especially noteworthy. Turning to the poetic drama, he utilised his knowledge of stage-craft with exceptional skill and produced a series of remarkable plays all of which were brilliant in a literary sense and several of which were successfully produced by Mr. George Alexander and Mr. Beerbohm Tree. Amongst these works were *Paulo and Francesca* (1899), *Herod* (1900), *Ulysses* (1902), *The Sin of David* (1904), and *Nero* (1905).

Phillips, WENDELL, orator, was born at Boston, Massachusetts, on November 29th, 1811, and educated at Harvard College. He was called to the bar in 1834, but becoming interested in the slavery question in consequence of the brutal attacks made upon the abolitionists, he determined to retire from professional practice and devote himself to pleading the cause of the negro. This he did by voice and pen, and succeeded in creating an irresistible public opinion in the Northern States in favour of freedom. Even after the Civil War broke out, he had incessantly to press President Lincoln to issue the edict of emancipation, which was at last proclaimed (January 1st, 1863). Phillips kept the American Anti-Slavery Society in harness until 1870, to provide against emergency and backsliding. He was also a strong Temperance advocate. In 1881 Harvard paid him the high compliment—long delayed, if not begrudged—of asking him to deliver the address at the centenary of the Phi Beta Kappa Society. He died at Boston on February 2nd, 1884.

Phillipsia, one of the four genera of Trilobites which lived in Carboniferous times, and thus were the latest representatives of this great group. It was named after William Phillips (1775-1828), the geologist and mineralogist.

Philo Judæus, an Alexandrian Jew of the 1st century, who holds an important position in the history both of philosophy and religion, was born probably between 20 and 10 B.C. He belonged to the sect of the Pharisees, and received a wide

education, embracing both the literature and philosophy of Greece and the religious writings of his own people. Conceiving that the knowledge of truth is not confined to any one race or age, he made it his aim to reconcile the teaching of Plato and the Academy with the Mosaic dispensation and the conception of God contained in the Old Testament; yet he never ceased to regard the Jewish Scriptures as a special revelation which, by the Divine appointment, was to be conveyed to mankind at large through the agency of the chosen race. He was zealous in maintaining the literal truth of the Pentateuch, yet he regarded it as susceptible of an allegorical interpretation also. Indeed, in his hands, the symbolical meaning often becomes the more important of the two. Philo maintains that the universe was fashioned, and is now regulated, by means of certain *dunamis* (active powers) or *hypostases*, the highest being the Logos or Word, whom he describes as "the High Priest," "the Shadow of God," "the First-born Son," identifying him at the same time with the Angel of the Covenant of the Old Testament. Concerning Philo's life few details have come down to us. He is known to have visited Jerusalem on at least one occasion, and about A.D. 40 he was the head of an embassy sent to Rome by the Jews of Alexandria to protest against the enforcement of the worship of the emperor.

Philology (literally, "study of words") is a word that has much changed its signification in course of time. Originally, it denoted what we should now call the cultivation of literature and literary criticism, and it held this signification among the Greeks and Romans and in Europe in the period which followed the Renaissance, and still retains it, to some extent, in Germany; but towards the middle of the 19th century it began to change its meaning and to be applied to that systematic study of the structure of languages and their affinity to each other which is more properly called Comparative Philology. In place of wildly hypothetical conjectures and fanciful derivations, scientific methods began to be employed, and languages began to be studied geologically (*i.e.*, their different strata were examined with a view to historical succession) and geographically (*i.e.*, the whole field of languages was mapped out and compared). The two great instruments in the progress of the science were the discovery of Grimm's Law, which established the fact that certain letters or sounds interchanged with each other in an order seldom varying in certain groups of languages; and the study of Sanskrit, which may be said to have been initiated by Sir William Jones in 1783. Knowledge of Sanskrit showed that the group of tongues now called Indo-European have evident features of kinship and that they all spring from an earlier tongue—sometimes called for convenience Aryan—which was spoken at a period when people of the race had already arrived at an important degree of civilisation and had adopted the family life which they have retained since, for words which run throughout the group express these ideas and relationships. The appearance of Bopp's

Comparative Grammar in 1833, and the researches from that time till now of many zealous workers into Indian and Persian literature and language, have established the science upon a firm and unquestionable basis. Among the most famous workers in this direction must be mentioned Professor Max Müller, who made Comparative Philology a life-labour, while Archbishop Trench popularised the subject in his *Study of Words*. Philology has established that the languages of the world may be arranged into a few groups of which the principal known are:—(1) Aryan or Indo-European, (2) Semitic, (3) the Dravidian tongues of South India, and (4) languages of which Chinese may be taken as typical. There are many points of similarity between Aryan and

ARYAN	SANSKRIT	{	Hindustani.
			Cingalese.
	IRANIAN	{	Zend.
			Modern Persian.
	INDO-EUROPEAN	{	SCLAVONIC {
			Bohemian. Russian. Polish.
		{	TEUTONIC {
			Scandinavian { Icelandic Norwegian. Swedish. Danish.
		{	High German—Modern German.
			Low German { Flemish. Dutch. English.
	PELAGIC	{	Latin { French, Italian, etc., known as the Romance languages.
			Greek.
	CELTIC	{	Ancient Irish { Manx. Gaelic. Erse.
			Ancient British { Armorican. Welsh.

some of the Semitic tongues. The above table shows the generally received grouping of the Aryan and Indo-European tongues. The European tongues which do not belong to the Indo-European family are the Magyar, Basque, Turkish, and those spoken by the Finns and Lapps.

Philopemen, "the last of the Greeks," general of the Achæan League, was born at Megalopolis, in Arcadia, in 252 B.C. After taking part in the civil wars of Crete, he was in 210 placed at the head of the Achæan cavalry, and two years later became *strategos* or commander-in-chief of the League. His victory over the Spartan tyrant Machanidas at Mantinea (208) secured for Greece a period of peace which lasted several years. In his subsequent struggle with Nabis, the successor of Machanidas, he gained such advantages that in 188 the Spartans were compelled to pull down their walls and accept the laws of the Achæans in place of those of Lycurgus. Named *strategos* for the eighth time in 183, he rose from a sick bed to suppress a revolt of the Messenians, but was taken prisoner, led pinioned through the streets of Messene, thrown into a dungeon and forced to drink the poisoned cup. The Achæans, infuriated at the

base treatment of the aged hero, devastated Messenia and required all who had been concerned in the murder of Philopemen to kill themselves. His body was burned and his ashes were conveyed back to Megalopolis with every circumstance of universal grief.

Philosopher's Stone. One of the most prominent features of the creed of the alchemists [ALCHEMY, CHEMISTRY] was the belief in the transmutability of all metals. The point aimed at then was, of course, the conversion of the commoner metals into the more precious gold. The agency by which this desired result was to be effected was the philosopher's stone, of the existence of which not a doubt was entertained, and many of the

philosophers of the Middle Ages—e.g., Albertus Magnus, Roger Bacon—spent much time in the search for this Will-o'-the-wisp. It seems incredible that men of undoubted learning could delude themselves into the belief that the philosopher's stone had unlimited powers and that an immense quantity of gold could be prepared through the agency of the smallest amount of this wonderful substance; yet stupendous as was the folly of it all, in many cases neither the sanity nor the sincerity of the dupes can be successfully assailed. This extraordinary stone, they also deemed, was further endowed with other miraculous powers, being

capable of curing all bodily and physical infirmities, and hence of prolonging life almost indefinitely.

Philosophy is an investigation of the first principles of human knowledge. It seeks an answer to such questions as these: Are there any propositions of the truth of which we can be certain? How is their truth to be tested—by an appeal to "experience," or by ascertaining their agreement with certain "forms" inherent in the mind itself? If nothing is found to be certain, then we get the doctrine of philosophical scepticism. If one of the other positions is taken, we have respectively philosophical experientialism or rationalism. Having found what makes knowledge valid, the philosopher goes on to determine, with more or less completeness, what is to be thought about the whole of things. The scientists deal only with the parts, and take for granted various assumptions. Philosophy examines the assumptions, distinguishes appearance from reality, re-states the results of science in accordance with this distinction, and brings the parts into a system. This is the course it now takes: first, critical examination of knowledge, then speculative construction. Historically, the process was the opposite.

Philosophy began as a theory of the universe. The philosopher did not first try to discover whether anything can be known, and if so what can be known; but, trusting to the mind's powers, laid down some principle as certain, and proceeded to explain everything by means of it. Philosophy was not then distinguished from special science, but included science in itself. The sciences have gradually become separate, as it has been found possible or necessary to treat aspects of things apart from the whole, philosophy retaining for itself the theory of the whole and the criticism of scientific assumptions. When philosophers began with untested general principles the notion was that these, as soon as stated, were obvious. It was found, however, that different philosophers took different starting-points, and that the theories of the universe attained were quite different and even incompatible with each other. From the perception of this sprang, first, assertions that nothing could be known, then attempts at reasoned selection of true principles. It was seen that only when comparison had been made among principles was genuine philosophical construction possible. This historical movement has not taken place once for all, but has been frequently repeated. Constructive periods and critical periods have alternated, but the general result has been that critical investigation of knowledge has had to become constantly severer and more systematic. This has meant that philosophers have had to turn more and more to investigation of the mind's powers. Philosophy has thus acquired a special association with mental as distinguished from natural science. So far, only theoretical philosophy has been spoken of, but philosophy has also its practical department. Not only have we to distinguish true from apparent knowledge; we also have to learn what objects of desire are good, and what modes of action are right. Where disputes arise as to which of the various modes of action that men spontaneously adopt are directed to the proper end, or are according to the true rule, these differences have to be brought to the test of practical philosophy. Theoretical knowledge of the universe and of men in their relations to one another has to be followed by practical directions to choose certain ends, or to act according to certain rules. All knowledge has to be brought into relation with these, so as to make clear what means must be taken for attaining the ends, or for applying the general rules to particular circumstances. Thus philosophy includes ethics as well as metaphysics. It also includes aesthetics, the object of which is to discover why certain things in nature and in art are considered beautiful, to determine what really constitutes beauty, how this can be known, and how it can be realised. Philosophy, theoretical and practical, has appeared in all civilisations that have reached the stage of reflecting upon the world and upon themselves. European philosophy began in Greece about the seventh or sixth century B.C. From then till now it has been cultivated with very different degrees of zeal and success in different ages and countries; but during the whole period of more than two thousand years it has a history

that has never been absolutely broken even in the darkest and most retrograde epochs.

Philostratus, the Greek sophist and rhetorician, was born probably at Lemnos, an island in the Greek Archipelago, between A.D. 170 and 180. He may have taught at Rome, but all trace of him is lost after 249, as to which Suidas mentions that he was living in the reign of the Emperor Philip (244-249). His works include a *Life of Apollonius of Tyana* (written by command of the Empress Julia Domna) and *Lives of the Sophists*. "A philosopher," he explains, "investigates truth; a sophist, taking truth for granted, proceeds to decorate it." The *Heroicon* is a vindication of Palamedes, the soldier and scholar who was done to death by deceit before Troy, and of whose cruel fate Homer's silence is regarded by Philostratus as an intentional injustice. The *Imagines*, a treatise of art, describes a number of pictures respecting which the controversy is still waged whether they were actual or imaginary paintings. In any case the book is valuable for the light it sheds on ancient art.

Philtre, a love-potion, a draught supposed to have the virtue of exciting in the person who drinks it love for him or her who administers it. Magical rites were used in their preparation, and philtres were freely employed in classic times. In many cases noxious drugs found a place among the ingredients, and it is more than likely that, under the guise of a philtre given for a variety of fanciful purposes, actual murder and, in some cases, suicide were committed. There is a legend (probably unfounded) that the death of the poet Lucretius (99-55 B.C.) was due to the effects of a love-drink of this kind administered by his wife.

Phipps, SIR WILLIAM, Governor of Massachusetts, was born at Penaquid, Maine, United States, on February 2nd, 1651. He began life as a ship's carpenter, and then became a merchant captain. Making, as we should now say, a speciality of the recovery of sunken treasure, he was instrumental in saving the Hispaniola plate (1687), valued at £300,000, of which £16,000 was awarded to him. On arriving in England on June 28th, 1687, he was knighted. Two months later he was made Provost Marshal-General of New England, but returned to England within a year. In 1689 he was in Boston again, and threw himself into the public life of Massachusetts. He was in charge of the expedition against the French colony of Port Royal (1690), which, unready for resistance, at once surrendered. An attack upon the French in Quebec and Montreal, however, undertaken in the same year wholly miscarried. In 1691 Phipps was appointed Governor of Massachusetts. He was an indifferent administrator, taking no steps to put down the cruel anti-witch crusade then in full swing. Making himself generally obnoxious he was recalled to answer certain charges against him, but died in London on February 18th, 1695, before proceedings were begun.

Phlebitis, inflammation of the coats of a vein. When the internal coat is affected the blood

in the vessel forms a clot or thrombus, and thrombosis and phlebitis are thus associated one with another. The symptoms of phlebitis are the presence of tenderness and reddening over the course of the vessel affected, and this is moreover marked out by the existence of what feels like a hard cord in the position of the vein. Phlebitis may be due to injury, to the extension of inflammation from the tissues surrounding the vein, to gout, and other causes. When it follows confinement, as is sometimes the case, it gives rise to the condition of white or milk leg, in which the leg becomes greatly swollen and painful, and assumes a white tense appearance. This condition is extremely troublesome. In suppurative phlebitis the cause of the mischief is a micro-organism. It occurs in connection with wounds which assume a septic condition, in acute necrosis, and in pyæmia.

Phlebotomy. [BLEEDING.]

Phlogm. [BAST.]

Phlogiston. During the 18th century the whole theory of chemical reactions, more especially in relation to combustion, was founded upon the supposititious existence of an element known as phlogiston. All combustible materials were supposed to contain this substance, and the more they contained the more actively did they burn on ignition. During combustion the phlogiston escaped and a dephlogisticated product was left. By a slight extension it is seen that metals were supposed to consist of their calces—i.e., oxides—with the addition of phlogiston, and the reduction of a metallic oxide by carbon or other reducing agent was regarded as due to the combination of the phlogiston, so plentiful in the latter, with the calx. These views, enunciated first by Georg Ernst Stahl (1660-1734), were held by a large number of distinguished chemists, as Joseph Black, Scheele, Henry Cavendish, and Joseph Priestley, the two latter of whom, it is noticeable, though firm adherents of the theory, contributed much to its overthrow. The fact that the calces weighed more than the metals from which they were produced was explained by the assertion that phlogiston was a "principle of levity." In this fact, however, lay the nucleus of the phlogistic downfall, although the establishment of the oxygen theory of combustion now held was only brought about after a long and arduous scientific struggle, and chiefly through the instrumentality of the great French chemist Lavoisier.

Phlox, a genus of North American plants, belonging to the order Polemoniaceæ, among the Gamopetalæ, cultivated for their showy flowers. These are generally borne in large panicles terminating erect, unbranched stems, and have their parts in whorls of five, and a broad salver-shaped corolla. They are mostly white, red, or purple, and hybridise freely.

Phocion, the last eminent Athenian who was both a general and a statesman. He was born probably about 402 B.C., the son of Phocus, a man of humble origin. Plutarch tells us he studied

under Plato and Xenocrates and possibly under Diogenes. He first distinguished himself at the battle of Naxos, in 376, where he commanded the left wing of the Athenian fleet under his friend Chabrias. In 351 with Evagoras he commanded the forces collected to conquer Cyprus for Artaxerxes III. and succeeded in subduing the island. In 343 some of the chief citizens in Megara having conspired to betray their town to Philip, Phocion was sent to defend it and the conspiracy was defeated. He was sent, in 340, to help the Byzantines against Philip, who was compelled to abandon his attempt on Byzantium and to evacuate the Chersonesus. Phocion seized several of his ships and recovered cities held by the Macedonians, but ultimately his wounds obliged him to sail away. His success led him to advise a peace with Philip, but the counsels of Demosthenes prevailed and he was over-ruled. Within two years the independence of the Greek republics was lost at the disastrous battle of Chæronea, 338. On the murder of Philip Demosthenes proposed to honour the assassin's memory with religious rites. Phocion resisted this as betokening a mean spirit and he succeeded in checking unseemly rejoicings, but failed to moderate the joy of the people when Alexander died. He vainly opposed the war with Antipater, the regent of Macedonia. The confidence of the newly-appointed general he rebuked. "Your words," he said, "are, like cypress trees, stately and high, but they bear no fruit." Again the Athenians were defeated, and it fell to him with others to obtain the best terms they could from the conqueror. After Antipater's death (318) Phocion became involved in political intrigues. He was accused of treason and fled to Phocis, but was given up to the Athenians and sentenced to death. When asked if he had any message for his son, he replied, "Only that he bear no grudge against the Athenians." He died in 317, aged eighty-five, and his body was flung over the borders of the state, and afterwards burned by his friends. His bones were brought back to a repentant people, who interred them at the public expense, raising a brazen statue to his memory, while his accusers were condemned to death.

Phocis, an ancient Greek state, which lay N. of the Corinthian Gulf and W. of Boeotia. It contained Mount Parnassus (8,068 feet) and the rivers Cephissus and Pleistus. It was mountainous and, except the valley of the Cephissus, unproductive. The state is said to have derived its name from its coloniser, Phocus, son of Ægeus. The people were industrious agriculturists, and proved their bravery in different wars. In the Peloponnesian War they were allies of Athens. Their last appearance in history was when they defended Delphi against the Gauls in 279. Their most important cities were Delphi, the seat of the famous oracle; Elatea in the valley of the Cephissus; Abœ, where there was another oracle of Apollo, and Anticyra (the modern Aspraspitia), near which grew the best hellebore which the ancients regarded as an infallible cure for insanity. As to this they had a proverb applied to a person who acted senselessly,

Naviget Anticyram ("Let him sail to Anticyra [and get cured])."

Phœbus, from a Greek word signifying "bright" or "pure," an epithet of Apollo, regarded as the sun god. Similarly Artemis (Diana) is often called Phœbe, the goddess of the moon. Underlying this sense is a sympathy with the radiance associated with youth. Apollo was represented as an athletic young man of beautiful physique. Figuratively, the poets have used both Phœbus and Phœbe for the sun and moon.

Phœnicia, an ancient country on the coast of Syria, of somewhat indeterminate size. It is supposed to have extended from the Orontes in the north as far south as Mount Carmel, while inland it reached to the Lebanon, from which flowed the numerous streams that watered the country. Among the chief towns were Tyre, Sidon, Beyrout and Acre. The land is fit for cereals, fruits, and, in the uplands, timber, and there is some iron near Beyrout. The people were famous for three industries, namely, glass-making, embroidery and purple-dyeing. The invention of glass, once generally ascribed to them, seems to have been due to the Egyptians, but the presence of the murex, the purple-yielding mollusc, all along the seaboard readily accounts for the prominence of the dyeing trade. The harbours which in ancient times were a hive of industry are nearly all silted up and Beyrout almost alone offers a safe port to modern vessels.

Phœnicians, a renowned Semitic people, whose original home is supposed to have been in the islands and round the shores of the Persian Gulf, whence they migrated in prehistoric times to the head of the Mediterranean, between Asia Minor and Egypt. Here they founded Tyre, Sidon, and other flourishing marts, and over 3,000 years ago became the chief intermediaries of trade and intercourse between the eastern and western nations, and the great seafarers of antiquity. They founded numerous settlements, such as Utica, Carthage, and Cadiz on the Mediterranean seaboard and beyond what is now the Strait of Gibraltar, traded with the British Isles, introduced a knowledge of letters into Greece, circumnavigated Africa once, if not twice, and contended with Rome for universal empire. It may be remembered that in the Royal Exchange, London, there is a fresco by Lord Leighton (painted in 1895) representing "Phœnicians bartering with Ancient Britons." Their Semitic language is nearest allied to Hebrew, and was written in the oldest known alphabet, most probably derived from the hieratic and demotic phonograms of the Egyptian or Chaldean hieroglyphics. Numerous inscriptions are still extant in this script, which is the direct or indirect source of nearly all current syllabic and alphabetic systems.

Phoenix. In botany, a genus of pinnate-leaved palms, the chief palm of history and ceremony, having been utilised as the emblem of triumph from the Egyptian worship of Isis downwards. In Homeric mythology, Phoenix was King of

Phœnicia (named after him) and the father of Europa (Europe, by interpretation, thus coming from Phœnicia). The Phoenix mentioned in the *Iliad*, who was young Achilles' teacher, and who took part in the Calydonian hunt, was son of Amyntor. His mother urged him to dishonour his father's mistress. When Amyntor discovered this he put out his son's eyes. Phoenix then fled to Peleus, who took him to Cheiron, by whom his sight was restored. According to Herodotus the phoenix was a fabulous bird, resembling an eagle, regarded by the Egyptians as the emblem of immortality. When it arrived at the age of 500 or even 600 years it built itself a funeral pile of wood and spices which it fanned into flame with its wings, and emerged from the ashes into new life. Another version relates that only one phoenix lived at a time. When it died a worm crept from the dead body which the heat of the sun developed into a new phoenix. When Sir Christopher Wren had drawn the circle for the dome of the new St. Paul's Cathedral he sent a mason for a stone to mark the exact centre. From the *dibris* of the old church he brought a fragment of an old gravestone inscribed *Resurgam*. This happy omen is commemorated in the pediment over the south portico by a sculptured phoenix rising from its own ashes. Phoenix Park, the famous pleasure ground in Dublin, has no reference to mythology, the name being a corruption of the Gaelic *fiom uisge*, "fair water," so called from a chalybeate spring adjoining, once resorted to as a spa.

Pholadidæ, the family of bivalved mollusca of which Pholas, or the Piddock, is the type. The shell is gaping, is composed of very hard material, and is armed with strong ribs and teeth on the external surface: by means of these it excavates a vertical burrow in chalk, mud, and soft rocks.



PHOLAS, OR PIDDOCK.

The animal makes a series of half-turns in its burrow and thus wears away the matrix, the powder of which is washed out by a current of water. They are all marine shallow-water inhabitants, and range in time from the Lias onwards.

the piddock is edible, and is sometimes used as bait in British waters.

Phonetics, literally, the enunciation of the principles upon which the production of sound depends. The term, however, is generally applied to those principles which govern the production of articulate human speech. Attempts have been made to establish the fact that articulate speech obtains among animals other than men, but they have not resulted in any positive evidence of this. In one sense phonetics is a branch of physiology, since speech is resultant of breathing processes modified by the conditions of the larynx, tongue, and mouth, and nasal spaces. Some have considered that speech so modifies some of these parts that an examination of them would go far to determining to what race, or at least to what group of languages, an individual belongs by descent. It is chiefly as an aid to philological discoveries that phonetics has a practical value. The term phonetic is also applied to a system of spelling the object of which is to reproduce in letters the exact sound of words, and this use of phonetics has many supporters, especially among those who have to do with shorthand. This mode of speech is illustrated by printed organs and magazines, whose repulsiveness to the eye goes far to render any wide spreading of the system unlikely. Sir Isaac Pitman made a heroic effort to accomplish this alleged reform, and in 1906 the Spelling Reform Association of the United States, with the strong backing of President Roosevelt, issued a preliminary list of three hundred words that were to be spelled phonetically. Many of these were the familiar *or* for *our* (as "candor"), *er* for *re* (as "fiber"), *gram* for *gramme* (as "program"). Others dropped one of the *r*'s in such words as "traveller." Further alterations were *throo* for *through*, *tho* for *though*, "catalog," and "kist" (kissed). But it did not come into use. Under the presidency of Professor Skeat the Simplified Spelling Society was formed in London in 1908.

Phonograph, an instrument for mechanically recording and reproducing sounds, invented in 1877 by Thomas Alva Edison. Sounds, being vibrations of the air, will, if produced near an elastic diaphragm, cause it to vibrate similarly. If the diaphragm be provided with a sharp but smooth point projecting from its centre, and if this point just touch a sheet of tinfoil supported in a suitable way and moved at right angles to it, a series of indentations will be produced. When the diaphragm is moved towards the tinfoil it will make a small hollow, but will leave a little hill when it moves in the other direction. In this way the sheet of foil forms a record of the sounds. If the foil is again moved past the point, the latter will be pushed back and forth by the indentations, and as the diaphragm moves with the point it will be thrown into vibration and the original sounds will be more or less accurately reproduced. In the original instrument the foil was wrapped round a cylinder having on its service a spiral groove and turning on an axle on which was cut a screw-

thread of the same pitch as the spiral; this axle turned in a nut, so that the cylinder moved longitudinally while it was being turned. By this means the point on the diaphragm was always kept opposite the groove. If words were shouted



PHONOGRAPH: POSITION OF THE DIAPHRAGM WHEN RESTING UPON THE WAX CYLINDER.

into a mouthpiece attached to the diaphragm while the cylinder was rotated by clockwork, and if the cylinder were afterwards put back to its original position and again rotated, sounds were emitted which bore some resemblance to their original, so that if one had heard them spoken into the instrument one could generally recognise them. An improved instrument was afterwards made by Charles Sumner Tainter and Edison, in which a cylinder of wax replaced the tinfoil, a groove of varying depth being cut on it by a sharp point shaped after the manner of a turning-tool. When the machine is required to talk, another diaphragm, provided with a "trumpet" or with tubes for insertion in the ears, is put in position. The cylinder is rotated by an electric motor or, more generally, by clockwork. In recent years the articulation has been made very much better, and the volume of sound modulated. The original pattern produced plenty of sound, such as it was—it could, indeed, be heard by the whole of a small audience—but it lacked clearness of expression, and was often very harsh. Various uses have been found for the phonograph. The voices of great statesmen and famous singers have been perpetuated, and the performances of an orchestra and a brass band at full strength have been recorded. Merchants have dictated their correspondence to the machine, and shorthand typists have afterwards reproduced it. It has even been suggested that the phonograph can be employed as a means of correspondence, the

wax cylinder being transmitted through the post. Machines of the "Gramophone" type (the word, by the way, is a trade-name) are also voice-producers, but in such the reproducing surface is flat and made of metal or vulcanite on which the record is cut by a stylus. The record rotates horizontally.

Phenolite, or CLINKSTONE, a compact, grey, semi-crystalline lava, consisting mainly of sanidine feldspar and nepheline, and named (from the Greek *phōnē*, "sound") on account of the ringing sound it emits when struck with a hammer. Its specific gravity is about 2.58. It is of Tertiary age, and occurs among the lavas of Auvergne and Bohemia. In thin slabs it is used for roofing.

Phoronis, the genus which forms the class Vermiformia, which used to be included as an aberrant group of Bryozoa and was even once regarded as one of the tube-dwelling worms. The group of tentacles around the mouth forming a true "lophophore," however, shows its affinity to the Bryozoa. The animals live each in a leathery tube, and the tubes are united in small colonies. The genus occurs on the British coast.

Phosphates. The phosphates are the salts of the phosphoric acids, being divided into orthophosphoric, and meta-phosphates, according as they are derived from the acids with corresponding prefixes, represented respectively by the formula: H_3PO_4 , $H_4P_2O_7$, HPO_3 . The first acid is the most important, and is that meant usually by phosphoric acid. Its anhydride, P_2O_5 , is a white powder which absorbs water with great avidity, and is hence very useful for drying gases and liquids. The acid itself may be prepared by the action of nitric acid upon phosphorus, or from bone-ash by the action of sulphuric acid. It forms rhombic six-sided crystals which are easily soluble in water. It forms three series of salts (ortho-phosphates), i.e., those in which 1, 2, or 3 atoms of hydrogen are replaced. They are recognised in solution by the yellow precipitate they give with silver solutions, and are employed in the chemical laboratory for the quantitative estimation of magnesium. The phosphates, chiefly in the form of the acid calcium salt, are very largely employed in agriculture. As phosphorus is an essential constituent of plants, and the supply is entirely drawn from the soil, unless phosphorus is added in the form of natural or artificial manures, the soil becomes exhausted and the crops deteriorate. Experimental farming, as at Rothamsted, in Hertfordshire, where it was initiated by Sir John Bennet Lawes in 1843, has conclusively shown how marked is this influence of the proper addition of phosphorus (in a condition available for plant assimilation) upon the quality and quantity of the crops obtained.

Phosphatic Nodules are generally rounded and water-worn masses of animal, or of purely concretionary origin, containing a considerable percentage of phosphate of lime. [APATITE.] They vary considerably in different geological formations. In the Bala limestone, in the Ordovician of North Wales, they occur in a graphitic matrix, and contain 64 per cent. of phosphate. In rocks of similar age

in Canada the nodules are believed to be coprolites, the petrified excrement of animals, as they certainly are, in part at least, in the Carboniferous shales of Scotland. These last are associated with bones and scales of large ganoid fishes, and contain those of smaller ones. Coprolites of fishes and saurians are not uncommon in Secondary rocks, but do not occur together in any quantity. In Cretaceous rocks, such as the Lower Greensand of Bedfordshire and Cambridgeshire, the Gault, and the Upper Greensand, at several horizons and in various parts of England, beds of phosphatic nodules occur which consist largely of rolled fragments of ammonites and other fossils, derived in most cases from Upper Jurassic rocks as a beach deposit. Similarly, near the base of the Pliocene of Suffolk a bed occurs, erroneously called coprolitic, which consists of rolled and highly-phosphatised bones and teeth of sharks and mammals, possibly the result of the denudation of some of the Black Crag of Antwerp. With these rolled fossils are associated structureless masses, which are also phosphatic and would appear to have a purely chemical origin. It is suggested that these may have been originally mainly calcareous and that they, in common with the derived fossils, have been phosphatised by replacement, the phosphoric acid from beds of decaying seaweed being attracted by pre-existing traces of phosphorus, common in all organic rocks and remains.

Phosphor-bronze consists of bronze with which is combined a very small quantity of phosphorus. This addition favourably influences the quality of the metal to a marked extent. The alloy formed is paler than the original bronze, is malleable and ductile, and withstands a very great tensile stress. It is also suitable for castings, and resists the corrosive action both of water and the atmosphere far better than bronze itself.

Phosphorescence is the property which some substances—e.g., sulphides of barium, strontium, and calcium—exhibit of shining in the dark. The body really absorbs light which falls upon it from some source, and gives back this light again when the source is removed. White light is not necessary for the exhibition of this phenomenon, it being chiefly caused by the violet and ultra-violet rays. Becquerel's PHOSPHOROSCOPPE has revealed the fact that a great number of bodies exhibit the property of phosphorescence, but only shine for an extremely short time after the light is removed. This instrument consists of two discs, joined one behind the other, each with four apertures, those of one disc being half-way between those of the other. The substance is placed between the two discs, the whole being kept in a dark cylinder and used in a dark room. Into a small hole at one end of the cylinder a beam of light is sent, and the eye is placed at a corresponding hole in the other end, the substance being in a line between the two holes. The discs are made to rotate, and in consequence of the alternation of the apertures in the two discs, the observer only sees the substance when it is not exposed to the light. If the body be at all phosphorescent, it will, after receiving light through one aperture, give out the light

again a certain time after that aperture has passed on, and the speed of rotation can be so adjusted that the time during which the body imprisons its light is equal to an eighth part of the time of rotation. In that time one of the apertures of the other disc will have come opposite to the body, and so it will be seen by the observer. With this machine phosphorescence lasting only a ten-thousandth of a second can be detected. Ordinary phosphorus is luminous in the dark when rubbed, and this is the origin of the term phosphorescence. Animal phosphorescence is exhibited by both living and dead matter. In the case of the latter it is easy to show that it is due to the slow oxidation or combustion of the animal tissues or to the development of



GLOW-WORM.

bacteria. It is most typically shown in the case of the minute marine organisms such as the bacteria which grow around decaying fish, etc., or the infusoria which live on the surface, such as the tiny *Noctiluca miliaris*. These are only phosphorescent when irritated, as by waves or other disturbance of the water. Many more specialised invertebrates are also phosphorescent, such as, e.g., the Jellyfish, Cyanea, Sea-pens or Pennatulidæ as *Virgularia*, Ascidians as *Salpa*, Starfish as the common *Asterias*, Ophiuroids as the Sand-stars, the Siphonophora as *Physalia*, Mollusca as *Pholas*, and worms such as *Nereis*. But some land animals possess the same property, e.g., the earthworm and the common English centipede (*Scolopendra electrica*). The insects afford many of the most interesting examples, such as the Glow-worm (*Lampyrus noctiluca*), which is the male larva of a beetle, the Fireflies (*Elater*), the Hemipterous genus *Fulgora*, the moth *Noctua*, and some species of *Bombyx*, and the Mole Crickets. The cause of phosphorescence is still not fully explained; at one time it was thought to be due to slow combustion, similar to that which imparts phosphorescence to some inorganic bodies and some decaying animal matter. It is, however, now generally regarded as

due to nervous energy; just as in the Torpedo or Electric Eel, nerve-power is transmuted into electricity, so in phosphorescent animals it turns into light.

Phosphoric Acid. [PHOSPHATES.]

Phosphorus (symbol, P; atomic weight, 31), a non-metallic element which was first prepared in 1669 from urine. For a long time it was very costly and highly valued as a chemical curiosity, being exhibited to Charles II. and other European monarchs. It does not exist in nature in a free state. Combined with other substances, however, it enters into the composition of many rocks and minerals, while it is also an invariable constituent of the human body, being present chiefly in the bones and nervous tissue. Plants contain it as an essential constituent, and it is hence a necessary ingredient of fertile soils. It is chiefly prepared from bone-ash, being obtained by the reduction of calcium metaphosphate by means of carbon and silica. The manufacture is somewhat difficult and dangerous, owing to the extreme ease with which the element ignites, burning very readily in air with the production of dense white fumes. Ordinary phosphorus is a waxy-looking solid of specific gravity 1.8, melting at about 44° C. It oxidises if exposed to the air, and must therefore be kept under water. It appears luminous in the dark if moist, the luminosity being due to a slow oxidation. It has a crystalline nature, forming almost colourless octahedral crystals. It also exists in another amorphous variety, which possesses a red colour, and is heavier and harder than the ordinary variety, from which it may be obtained by heating to about 240° C. in the absence of air. This form does not oxidise when exposed to the air, and further differs by being non-poisonous and insoluble in the solvents of the crystalline phosphorus. By strongly heating with lead also the element may be obtained as metallic-looking crystals of specific gravity 2.34. Phosphorus is very largely employed in the chemical laboratory and in various chemical manufacturing processes, but by far the greatest quantity is used in the manufacture of lucifer-matches. With oxygen it forms two compounds of composition P_2O_3 and P_2O_5 , both of which are anhydrides of acids. With hydrogen it forms some interesting compounds, one of which possesses the property of spontaneous inflammability in air; while with chlorine it unites directly, forming chlorides which, together with the other halogen compounds, are largely employed for chemical purposes.

Photius, Patriarch of Constantinople, was descended from a wealthy and noble Byzantine family, and was born probably between 820 and 826. He became a favourite of Cæsar Bardas, uncle of the Emperor Michael III., and through his influence was raised to the patriarchate in 857, passing in the five previous days through all the preliminary orders, the patriarch Ignatius being deposed to make room for him. Ignatius was supported by the Pope Nicholas I., and a breach ensued between the Churches of the East and of the West, Photius raising difficulties concerning matters of doctrine and discipline, and (867) calling together a Council

which excommunicated Nicholas. In the same year the murder of Michael III. and accession of Basilius the Macedonian were followed by the recall of Ignatius and the banishment of Photius; but the latter afterwards became reconciled to his old enemy, and succeeded him as Patriarch (878). He was again deposed and banished, however, in 886, and ended his days in an Armenian monastery on February 6th, 891. His *Myriobiblion seu Bibliotheca* is a very valuable work, containing the names and short accounts of some 280 authors with critical remarks, and also extracts from or abridgments of their works the originals of which have mostly perished.

Photography. A photograph (from the Greek *phos*, "light," *graphein*, "to write") is generally accepted as meaning a picture or reproduction which has been obtained by the influence of light upon a sensitised surface. The first principles of photographic optics were discovered by Della Porta, who invented the camera obscura in 1569. A little later alchemists found that horn silver (native chloride of silver) blackened on exposure to light, and in 1777 the Swedish chemist Scheele made the discovery that the rays of the spectrum are not all chemically active in the same degree. The honour of producing the first "light" pictures belongs to Thomas Wedgwood (1802). But his photographs were not permanent, since he could not prevent the uncoloured portions of his picture from being acted upon by light, or, in other words, he could not "fix" his picture. Heliography, the science of producing permanent pictures by the influence of solar radiations, was invented by Nicéphore Niepce about 1814. By his process a piece of plated silver or glass, coated with asphaltum, was exposed in a camera obscura for four to six hours. Wherever light acted this asphaltum became insoluble in its usual solvents. Hence when treated with one of these solvents, the still soluble parts, that is to say the shadows, of the image dissolved and the lights were represented by the insoluble asphaltum on the plate. Daguerre, who had begun a series of experiments in 1824, went into partnership with Niepce in 1829. The Daguerreotype was the result of their efforts. The method of this was extremely simple. A metal plate, coated and sensitised with iodide of silver, was developed after exposure by vapour of mercury. The Daguerreotype was particularly successful in rendering human portraits, but it was scarcely the beginning of modern photography, almost all of which depends on the production of a "negative"—i.e., a transparent image in which the light portions of the object photographed are represented by dark in the negative and *vice versa*. For the first photographic negative we have to look to the Calotype process which W. H. Fox Talbot patented in 1841. The Talbot negative was produced by preparing paper with iodide of silver, gallic and acetic acid, and developing it after exposure by acetate of silver and gallic acid. This paper negative was rendered translucent with wax. The introduction of glass plates accompanied the invention of collodion, composed of a solution of pyroxaline in a mixture of ether and alcohol, by Scott Archer in 1851. Collodion was exclusively

employed by photographers for the next quarter of a century—in earlier years for the production of positives on glass, latterly, by modifications, for that of negatives. The glass was coated with collodion, to which was added bromide of cadmium and iodide of potassium or of ammonium, the coating being sensitised by nitrate of silver. The image was developed with sulphate of iron or pyrogallio acid to which was added acetic or citric acid, and it was fixed by the solvent cyanide of potassium. Collodion has now been superseded by an emulsion of gelatino-bromide in the preparation of plates. The great drawback of the collodion plate was that it had to be used immediately after preparation and whilst still wet, and to obviate this inconvenience the dry plate, coated with a gelatino-bromide emulsion, in which the silver salt is kept in suspension by the gelatine, was devised, first, by Dr. Maddox in 1871, improved upon in 1873 by Mr. Kennett, and again improved by Mr. Charles Bennett in 1878. It was found that if emulsion was kept at a high temperature for some days, or boiled for half an hour, its sensitiveness was greatly increased. Later, means were discovered of gauging the exact sensitiveness of a plate thus prepared. The method of developing a dry plate is substantially the same as in the case of the wet collodion plate. When the development is complete or has gone sufficiently far, the plate is taken out of the developer, washed and treated with a fixing solution—usually hyposulphite of soda—by means of which the unaltered silver bromide is dissolved out of the emulsion, while the darkened image of silver is left. The plate is hence no longer sensitive to light, to which it may be exposed without alteration, but previous to this stage, of course, all actinic light should be rigorously excluded from the "dark room" in which the operation is conducted. After fixation the plate should be washed thoroughly to get rid of the hyposulphite.

One of the most important inventions in modern photography was that of orthochromatic (or isochromatic) plates, which were introduced by E. J. Edwards in 1886. The orthochromatic plate brings it within the photographer's power to render more or less accurately the colour "values" in nature. Up to this date it was impossible to give correct exposure to all the colours in a picture, some being more actinic than others and thus being over-exposed if sufficient time was given for the less actinic colours to register themselves. Harsh contrast and the elimination of half-tones resulted in most negatives, and it was only possible to correct the drawback by modifications in the treatment of the plates; such as by "backing," whereby an exposure may be given to secure the feeble rays of the less actinic colours without imperilling the more actinic, or by (after exposure) local intensification and reduction. The orthochromatic plate does much to render these expedients unnecessary, and a further corrective of colour values may be found in the colour screens or light filters which are now employed. The combination of orthochromatic plate and colour screen is especially useful in the rendering of flowers and the copying of paintings and other multi-coloured objects.

The use of sensitised celluloid films carries the advantage of less weight and bulk than are involved by glass plates, and they are not subject to the halation caused by over-exposure of the high lights in a picture taken on an unbacked glass plate. On the other hand, the sensitive film is apt to lose its sensitiveness, if kept for more than a few months. Dealers in photographic appliances supply films in two forms—the flat and the roll. Flat films are generally placed in specially constructed sheaths for exposure, and are otherwise treated in the same manner as plates as regards their manipulation. Roll films in the cartridge form are long strips of different widths, each of which is attached to a longer strip of black paper and rolled up with it. The film is contained in a contrivance called a roll-holder, and its sections are exposed as required by turning a screw on the outside. The point of division between each section is marked on the outside black paper, and is visible through a red-glass window at the back of the holder. The invention is attributed to Silvy (1870), but it was developed commercially by Warnerke some years later, and the Eastman Company of Rochester, U.S.A., made it really popular. In the present state of development the roll film enables a camera both to be loaded and to have the exposed films taken out in daylight, thus obviating any necessity for a dark-room. Developing can now also be done in the daylight by means of a special developing tank. The use of celluloid as a support for the sensitised coating has now almost entirely superseded paper, hardened gelatine, &c.

One of the best all-round developers used to be composed of pyrogallie acid, potassium bromide, and ammonia, but this has now become old-fashioned owing to its unpleasant staining properties. A pyro-soda solution has taken its place, the slight yellowish tinge that it gives a negative favouring a successful print; and ferrous oxalate and hydroquinone are substances which form the basis of several well-known compounds. Rodinol, metol, amidol, eikonogen, etc., are frequently employed. In the event of thinness in a negative, either from under-exposure or other cause, it may be strengthened by intensification either with mercuric chloride or uranium.

A print or positive of the negative thus made is produced as follows. The negative is placed in a frame called a printing frame, with the glass side next to the light. Printing frames for films are provided with a plain glass face, as in a picture frame, so as to keep the film flat and in position. Upon the film or inner side of the negative is placed a sheet of sensitised printing paper of corresponding size, which is secured in position by the back or door of the frame. The back of the frame is usually divided into two portions connected by a hinge, so that it is possible to open one portion in order to see how the printing is progressing without disturbing the whole. The most popular form of print is known as the silver print. For this the paper is coated with a thin layer of gelatine or albumen, to which is added chloride of sodium or ammonium, sensitisation being obtained by floating in a solution of silver. When the paper is seen to be

sufficiently printed, it is taken out of the frame and at the time, or later, is placed in a toning bath, consisting of a dilute solution of gold chloride with borax or other salts, in order to make it of a more pleasing and softer colour. It is then fixed in the same manner as the negative, washed well and dried, when it is ready for mounting if desired. Dealers often supply a combined toning and fixing mixture for silver prints, but the results from its use are rarely satisfactory. In the preparation of the paper gelatine is now far more popular than albumen, those papers made with the former being better able to render delicate detail. Other direct printing processes include the Cyanotype, or blue printing process, which was first discovered by Sir J. F. W. Herschel in 1842—when it was chiefly used for copying plans and drawings on tracing cloth. This paper is prepared with ferric salts, and a simple washing completes the operation. Chrysotype is a modification of Cyanotype, and Kallitype is a ferric oxalate paper that lends itself to similarly simple manipulation. The Platinotype process is one of the best known and most favoured among pictorial workers in photography. The paper is coated with ferric oxalate mixed with a solution of chloro-platinite of potassium. Printing with this is not completed in the printing frame, the faint image resulting from printing by contact requiring to be developed by floating the exposed paper on a solution of neutral potassium oxalate, which is a solvent of the ferrous oxalate. Development is conducted in an enamelled tray over a spirit lamp or other heating apparatus, the developer being maintained at a temperature of about 175° F., subject to modification. The paper is fixed by dilute hydrochloric acid. The inventor of this process was W. Willis. A less-known way of treating platinotype is by local development with glycerine. Willis also devised a "cold bath" platinum process, and Captain Pizzighelli was responsible for the "Pizzighelli Platinum" paper, which is printed in the same direct manner as silver paper, and only necessitates a bath of weak acid for completing the process.

Some further papers requiring development after printing may be described categorically. Bromide paper is coated with gelatine emulsion and sensitised. For some time after its adoption by Messrs. Morgan and Kidd, of Richmond, it was used merely for negative work, as a plate or film might be used, the paper being rendered transparent by subsequent operation. These negatives, however, showed the grain of the paper on the pictures printed from them, and though this disability was partially obviated in after years, the paper gradually came to be used exclusively for the production of positives. Bromide printing is often by direct contact with the negative in the printing frame, but it is even more generally employed for the purpose of enlarging, for the manipulation of which process many species of instruments have been devised. Exposure may be made either by daylight or by artificial light. A number of so-called gas-light papers are derived from the bromide process, and many varieties of surface from the perfectly smooth to the *matte* have been introduced with a view to

obtaining the best results from various sorts of negatives. In the Autotype or Carbon process, carbon paper or tissue, as supplied by the Autotype Company, is coated with gelatine mixed with pigment in a very fine powder, and sensitised with ammonium bichromate. Wherever the light acts on the surface of this, the part acted upon becomes insoluble, but soluble portions still remain between the insoluble surface and the paper, and no picture is visible after due exposure till the latter are removed. The removal is effected by soaking the paper in cold water and applying it to any surface impervious to air, when the gelatine surface adheres to the support by atmospheric pressure. Then by soaking in hot water the paper at the back comes off with much of the soluble gelatine and pigment, and by washing the image remaining on the support with hot water it appears clean and perfect. This method is called the single-transfer process, and results in a print reverse as to right and left. In order to avoid the reverse, one of two courses may be adopted. Either a reversed negative may be used, or the "double-transfer" process may be employed. The latter consists of the adoption of a temporary support which holds the print till developed; the print is then transferred to the final support--non-reversed. Mungo Ponton (1839) was the first to discover the possibilities of carbon tissue, but he never surmounted the difficulty of removing the soluble gelatine, and the later experiments of Fargier and Swan in this direction only resulted in a troublesome and expensive method. Carbon printing did not become popular till J. R. Johnson (about 1868) discovered the present practice. Pouncey and Poitevin are credited with having been acquainted with the gum-bichromate process about the middle of the 19th century. It was re-introduced in 1894 by M. Rouille Ladeveze. Gum, like gelatine, becomes, when bichromatised, insoluble in proportion as it is acted on by light. The coating of gum and pigment in gum-bichromate holds the pigment imperfectly and yields to water. By reason of the looseness of its surface a gum-bichromate print affords plenty of opportunity for modification during development at the hands of a skilled worker, and is therefore in request by the new school of pictorial photographers. The principal methods of modifying are by brush development and local toning, but good results have been obtained by the adroit exclusion or admission of the light to various parts of the negative during printing. Needless to say, some artistic capacity is essential for the successful working of this process.

The various parts of the apparatus now claim some attention. The first camera made in England was by Palmer of Newgate Street, London, in 1839. It consisted, roughly speaking, of a box with a lens to which was attached a rack-and-pinion motion, by means of which the lens could be moved backwards and forwards for focusing purposes. The inconvenience of the arrangement was that it only allowed one lens to be used, and in this respect it was inferior to Daguerre's camera, where the lens was removable from the front of the instrument as

in the modern pattern. The Daguerre camera consisted of an inner box working on a slide within an outer one, and focus was obtained by sliding the inner box containing the plate-holder to or from the lens. It should be remarked that the focusing principle was the converse of what now prevails, since the process was to move the plate away from the lens or nearer to it, instead of altering the position of the lens. The bellows form of camera is said to have been introduced by Captain Fowke, R.E., about 1854. For some years afterwards the square form of bellows, as opposed to the tapering form, was universal. The tapering form came later, and among other comparatively modern improvements may be mentioned the swing-back, swing-front, and side-swing which are now to be found in every well-constructed instrument. An unlimited choice of cameras is now provided; they may, however, be divided into two principal types, namely the Studio type and the Field or Portable type. The ordinary studio camera, as used for portraiture, is usually mounted on a strong pillar stand, raised or lowered by an endless screw or rackwork, solidity of manufacture being necessary to ensure freedom from shaking. The principal features of an ordinary field camera are the tripod head and turn-table in the baseboard, and double-extension movements from the back and front (for use with long- or short-focus lenses). Many patterns of double dark slides are in use, and as an alternative to the slide we have the "roll-holder" and the "changing box" for plates or cut films. A striking modern development of the field camera is the Hand Camera, which has acquired its present popularity since 1885. In 1881 T. Bolas introduced his "Detective" camera, a portable box-shaped instrument, but it was not till 1888 that the Eastman Company brought out the Kodak, which paved the way for thousands of the same class. The camera for roll films (such as the Kodak) is, generally speaking, the most compact kind of hand camera, but there are others such as Magazine Cameras, which carry a supply either of plates or cut films, and others designed for dark slides, to which a roll-holder may be attached at will. Folding Cameras are a compromise between hand and stand cameras. They are fitted with the arrangements of an ordinary stand camera but close up into a box and, being very portable, can be used as a hand camera for instantaneous work. In view of the latter purpose the folding camera is generally provided with the accessories essential to a hand camera, such as a view-finder and a focusing-scale, for dispensing with the use of a ground-glass screen. The cheaper makes of hand camera have usually a "fixed focus," enabling objects either near or far off up to a certain limit to be rendered with tolerable definition, and both this "infinity" focus and focus by scale are arranged for in the better-class articles.

Lenses may be divided into the portrait and landscape classes, portrait lenses having a large aperture but giving a small image, and "view" lenses possessing a smaller aperture but including much more in the image. A lens suitable for photographing architectural and kindred subjects

at short range is called a wide-angle lens. In regard to the manufacture of lenses, the most important discovery was that of the Jena glasses in 1886, whereby objects could be reproduced free from astigmatism with its resulting want of definition.



NATURE PHOTOGRAPHY: MR. KEARTON PHOTOGRAPHING A SHAG.

In 1888 Dallmeyer introduced a landscape lens that was free from curvilinear distortion; the "Rapid Rectilinear" is now the favourite type of lens for ordinary landscape photography. Lens stops for reducing the aperture, lengthening exposure and securing better definition, are either separate metal discs which can be introduced into the body of the lens through a slit, or are contained in a mechanism working within the lens itself. A popular example of the latter kind is known as the Iris Diaphragm. This consists of a number of flat blades of thin black metal, fastened to a ring in the lens mount, which expand or contract as the ring turns. It should be noted that in the manufacture of modern lenses aluminium has been largely substituted for brass.

Shutters for instantaneous or time exposure of the plate or film are of two main types. A Focal Plane Shutter, such as the Thornton-Pickard or the Goerz-Anschutz, is a roller-blind shutter so arranged

that an adjustable slit moves rapidly just in front of the plate or film, exposing different parts of it in turn. In combination with a good lens exposures up to $\frac{1}{1000}$ or $\frac{1}{2000}$ of a second can be made by this type of shutter. The second type is the moving disc shutter working inside the lens near the diaphragm, as in the "Unicum," which is efficient where the less rapid kind of lens is employed. The release of shutters for exposure is often made by finger-pressure on a trigger that holds the moving part in a state of tension, but in many cameras, especially those of the folding kind, preference is given to a pneumatic ball, which being squeezed inflates a bulb placed against the releasing trigger, connection being made by a tube. A very recent form of camera is the "reflex" type, used where preciseness of definition is imperative. This class of camera enables the operator to see a reflected picture of the desired view right up to the snapping of the instantaneous shutter.

Perhaps the most fascinating branch of photography is nature-photography. This was introduced systematically by Mr. Cherry Kearton on the 10th of April, 1892, chiefly in illustration of the natural history work of that accomplished practical zoologist, his brother, Mr. Richard Kearton, F.Z.S. In his *Wild Life at Home* (London: Cassell) the latter describes the most useful appliances for open-air photography and explains how the animals may be found, studied and "taken." This work is the classic on the subject and the photographer, whether amateur or professional, cannot do better than consult it constantly.

Photogravure, the production of an etching upon a copper-plate from photographic negatives, effected by a combination of light, chemical action and hand-work. Of the many different processes one is called "Klic's method." A coppered plate is dusted with asphalt, which is partially melted by the application of heat. A negative carbon print is then transferred to it, and the design is eaten in by a solution of perchloride of iron (strong for the thin parts, and weak for the thick parts). Another process is the Calotype method. In this case the impression is taken upon bichromatised gelatine spread upon glass, and this plate is then washed and used as a printing-block. Still another method giving exquisite results is the "Rembrandt," the process of which is kept secret. Owing to the comparatively cheap price at which plates can be produced by the various processes, and, all things considered, having regard to the remarkable excellence of the results, the introduction of photogravure has practically destroyed the old arts of steel and wood engraving.

Photometry, that part of the science of optics which deals with the measurement of the relative amounts of light from different sources. The methods by which this result is obtained are mostly based upon the fact that it is easy approximately to detect by the eye when two similar surfaces are equally illuminated. The illumination on a given area of a screen from any light is inversely proportional to the square of the distance between

the light and the screen, and this is the foundation of all photometric calculations. Count Rumford's photometer (Fig.) consists of a screen with a cylindrical rod, *b*, placed a short distance away. Each of the two lights, *a* and *c*, which are to be compared throws a shadow of this rod on the screen, and the lights are moved until the two shadows, *a'* and *c'*, are equally illuminated. The ratio of the two lights is obtained by calculating, by means of the tape, *z*, the distances of each from the screen, and taking the ratio of the squares; the brighter light is the farther away. Bunsen's photometer consists of a screen made of two parts, the one being more transparent than the other. The old form was a paper screen with a grease spot. The two lights are placed on opposite sides and moved till the spot and rest of the screen look equally bright. When the one side of the screen is more illuminated than the other, the grease spot will look brighter than the rest of the screen, when viewed from the darker side, and it will look darker when viewed from the other side. The lights are therefore moved till this difference ceases to exist. The grease spot, however, was found to



RUMFORD'S PHOTOMETER.

be rather unsatisfactory; so, instead of this, a screen consisting partly of one and partly of two thicknesses of crown glass has been used. When two lights of very different illuminating powers are to be compared, it is often impossible to move the brighter light far enough away from the screen. A lens is then employed to form an image of the bright light, and the light on the screen is produced by this image. Since this brightness of the image is to the brightness of the original light in the ratio of the square of their distances from the lens, this gives a means of comparing two lights not so different in intensity. If the image and light are at distances *I* and *L* from the lens, their illuminating powers are in the ratio $\frac{I^2}{L^2}$. If the image at a

distance *A* from the screen gives the same result as the standard light at a distance *s*, then the ratio between the bright light and the standard is $\frac{A^2 I^2}{s^2 I^2}$.

Many other photometers have been introduced with the special object of testing the illuminating power of arc lamps. It is usual to give the illuminating power of any source in terms of the standard candle, the standard candle fixed by Act of Parliament being made of spermaceti, weighing $\frac{1}{4}$ of a lb., and burning 120 grains of material per hour. An argand gas-burner is, however, generally held as the official test-burner for gas.

Photophobia, intolerance of light. It is a distressing symptom in some forms of ocular mischief, notably in ulcerations of the cornea. Cocaine is of great service in the treatment of the condition. Inability to bear light is occasionally symptomatic of trifling and passing disorders, such as biliousness. Alarm need not, therefore, be felt when this condition first sets in. Should, however, the intolerance threaten to be lasting, it will then be wise to consult an oculist.

Photophone. It was discovered by Willoughby Smith in 1875 that when selenium forms part of a closed circuit, its resistance changes with varying illumination. Vitreous selenium has an enormously high resistance, but in its crystalline condition its conductivity is much increased, and it is then most influenced by light. Professor William Grylls Adams showed that the change of resistance was proportional to the square root of the illumination. Upon this property depends the action of the photophone, which may be said to transmit sound along a beam of light. The person whose speech is to be



transmitted causes, by the vibrations of his voice, a light mirror to be thrown into motion. The mirror reflects a beam of light to a distance, where it falls upon a piece of selenium connected in circuit with a battery and telephone. The mirror, in consequence of its vibrations, sends a varying amount of light to the selenium. Hence the resistance of the selenium is altered, and the variation of the current which is thereby caused reproduces the sounds in the telephone. The beam of light is originally sent through a lens, at whose focus the light mirror is placed; at the receiving end it is reflected from a parabolic mirror on to the selenium which is placed at the focus. In this way, greater variation of the light is obtained for the same amount of vibration. It has also been found that selenium will give out a sound without the aid of battery and telephone when a beam of intermittent light is thrown upon it. Experiments have shown that selenium is not alone in this property. Tellurium, antimony, gold, silver, carbon, parchment, hard rubber, and some kinds of wood are also electrically sensitive to light.

Photosphere, an envelope surrounding the nucleus of the sun and forming the visible limit of the sun's disc. According to Alexander Wilson's theory, the nucleus or main body of the sun was supposed to be solid and cool, while the photosphere was self-luminous and consisted of incandescent

gas. Kirchhoff considered the nucleus to be incandescent and the photosphere to be liquid. Arago's experiments on the polarisation of the sun's light supported the theory of a gaseous photosphere. M. Page considered this envelope to be a simple consequence of cooling, and regarded it as the limit separating the intense heat of the nucleus from the cold of space. The spectroscope has proved that the nucleus must be liquid or solid, not gaseous, since it glows with an intense white light, and the dark lines in the spectrum are due to the cooler vaporous photosphere. Since the lines prove the presence of magnesium, sodium, iron, copper, in a state of gas, it is obvious that the photosphere is not by any means at a low temperature, but only cooler than the nucleus itself. The dark centres of sun-spots give spectra the same as those of the photosphere, except that the dark lines are broader and more intense; hence it has been assumed that these spot centres are only compressed portions of the photosphere and consist of relatively cool vapours at a lower level.

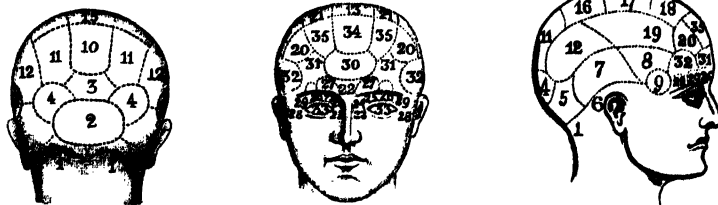
Phragmacone, the conical cavity at the upper end of the shell or guard of a belemnite. It is divided into a series of chambers by thin horizontal plates or septa; but the chambers are connected by a tube or siphuncle.

Phragmophora, a group of Cephalopoda including those which, like the Belemnite, possess a hard internal skeleton with a chambered cavity at one end. The group, which is extinct, included the *Belosepiidae*, *Belopteridae* and *Belemnitidae*, and was mainly characteristic of the Mesozoic period.

Phrenology, a deductive system which professes to locate the mental processes, and to read character from the brain-case or skull. It rests upon two assumptions:—First, that every pro-

the latter lectured in England and at Edinburgh, where he found a doughty opponent in Sir William Hamilton, who, after an examination of numerous skulls, established the fact that the external skull is no safe criterion of the size or development of the brain within, and was able to cite cases in which disease had destroyed much of the brain material without any apparent loss or change in the mental characteristics. The study of phrenology has found many adherents, but though there is a large amount of truth in the generalisations of its professors—just as there is in weather or plant lore—it is purely empirical and its claim to rank as a science is untenable. The medical theory that different functions are exercised by different portions of the brain is quite distinct from the doctrines of phrenologists.

Phrygia was in Persian times a central province of Asia Minor. At an earlier period the name Phrygians was applied to the Trojans, Lydians, Mysians, and other primitive inhabitants of Asia Minor; though Phrygia was probably first peopled in the earliest Aryan immigration. Later the country was divided into Greater and Lesser Phrygia, and Phrygia Epictetos. Its boundaries varied at different periods of its history, but in a general way it was surrounded by Bithynia on the N., Galatia and Lycaonia on the E., Pisidia on the S., Lycia and Caria on the S.W., Lydia on the W., and Mysia on the N.W. The modern village of Boghaz Keul probably indicates the site of its capital. Although their music was martial the people seem to have occupied themselves with grazing and agriculture. Much of their history was mythical, and the names of Gordius and Midas often occur among their list of sovereigns. The chief Phrygian deities were Cybele, typical of mother Earth, and Sabazius, typical of the life of



PHRENOLOGICAL CHARTS.

- (1) Amativeness, (2) Philoprogenitiveness, (3) Inhabitiveness, (4) Adhesiveness, (5) Combativeness, (6) Destructiveness, (7) Secretiveness, (8) Inquisitiveness, (9) Constructiveness, (10) Self-Esteem, (11) Love of Approbation, (12) Cautiousness, (13) Benevolence, (14) Veneration—situated on the crown, between 12 and 15, (15) Firmness, (16) Conscientiousness, (17) Hope, (18) Marvellousness, (19) Ideality, (20) Mirthfulness—Wit, (21) Imitation, (22) Individuality, (23) Configuration, (24) Size, (25) Weight and Resistance, (26) Colour, (27) Locality, (28) Calculation, (29) Order, (30) Eventuality, (31) Time, (32) Melody, (33) Language, (34) Comparison, (35) Causality.

pensity and inclination of human nature has its own place in the brain, such spot being increased in material development by the exercise of such function; and that these internal developments register themselves by corresponding developments of the external skull. The idea was first started by Franz Joseph Gall (1758-1828), a Viennese physician, in 1796, and was carried on by Johann Gaspard Spurzheim (1776-1832) in 1800. In 1814

Nature, renewed every year. The religion, especially in some of its grosser rites, had a strong influence on Greece, the orgies of the worship of Bacchus having their prototype in the frantic ceremonies of the worship of Sabazius. Phrygia was long ruled by Persia, but when the Persian line ended with Adrastus in 560 B.C., it became a province of Lydia, to fall again into Persian hands, and later into those of the Romans. In modern

times Phrygia is most commonly associated with the "Cap of Liberty," the pointed woollen cap with the peak turned over to the front, which was worn by the people of Asia Minor and other Oriental countries.

Phryne, a celebrated Greek courtesan, who lived at Athens in the 4th century B.C. She was so beautiful that she sat to Apelles for his famous picture of "Venus Anadyomene" ("Aphrodite rising from the sea"), and to Praxiteles for his statue of the Venus of Knidos. Though of humble origin, and at first earning a living by gathering capers, she amassed an enormous fortune and offered to rebuild the walls of Thebes, which Alexander the Great had destroyed (335), provided that the citizens inscribed them, "Destroyed by Alexander; restored by Phryne the courtesan." The citizens refused her offer. Xenocrates, the philosopher, resisted her charms, though she specially set herself to bewitch him.

Phrynichus. (1) A tragic poet, who occupies a position midway between Thespis, the alleged founder of Tragedy, and Æschylus in the development of the Attic drama. The Athenians were so much affected by his play, the *Capture of Miletus*, acted soon after the capture of that city by the Persians (494 B.C.), that they fined the poet 1,000 drachms and forbade its reproduction on the stage. Another great play, the *Phonissæ*—so named from its chorus of Phœnician women—celebrated the defeat of Xerxes at Salamis (480). Phrynichus gave greater prominence to the lyric element (the chorus) and the dance than to the acting. The sweetness of his songs secured them wide acceptance among the people. He was born in the latter half of the 6th century B.C., and died in Sicily. (2) A poet of the old Attic comedy, contemporary with Aristophanes. His first comedy was performed in 429 B.C. His *Solitary* gained third prize when Aristophanes' *Birds* was first, and with the *Muses* he ran second to Aristophanes' *Frogs*. (3) An Athenian general in the Peloponnesian War, who was assassinated in 411 B.C., after assisting to found the oligarchy of the Four Hundred at Athens. (4) A grammarian named Phrynichus Arabius flourished in Bithynia in Asia Minor in the 2nd Christian century. His chief work was his *Sophisticæ Paraskenæ*, containing a collection of Attic words and phrases, with rules as to their proper use. He assigned the foremost place in respect of style to Plato, Demosthenes, and Æschines the Socratic.

Phthisis. [CONSUMPTION.]

Phylactery (Greek, *phylakter*, "a protection") signifies generally a charm or amulet. Among the Jews it had a very special sense. A phylactery consisted of a strip or strips of parchment which were inscribed with certain Bible texts and enclosed in a small leather case. The phylacteries were two in number. The head phylactery contained four parchment strips fitted into a case of four compartments. The Scripture texts employed, one for each strip, were—taking them in the order (from left to right) in which they are placed in a phylactery—Exodus, xiii. 1-10; 11-16; Deuter-

onomy, vi. 4-9; xi. 13-21. This phylactery is fastened by means of straps to the forehead above and between the eyes. The head phylactery consisted of a single compartment large enough to hold a strip of parchment on which all four texts are written in parallel columns. This is strapped on the inner side of the bared left arm, just above the elbow, so that when the arm is bent the phylactery may rest "upon the heart." While the phylacteries are being bound on (usually at morning prayer every week-day) benedictions are recited. The colour of the phylacteries is black. Though the custom of wearing them is founded on a literal interpretation of the Bible passages already cited there is strong reason to believe that their introduction cannot be dated earlier than 250 B.C., if indeed, 140 to 105 be not nearer the date. In denouncing the formalism and ostentation with which the Pharisees discharged their religious functions Jesus accused them of "making broad their phylacteries," in other words, of spiritual pride.

Phylactolæmata, a division of the moss-like animals known as Bryozoa. It belongs to the sub-class Ectoprocta, which includes those that have the anus opening outside the ring of tentacles around the mouth. The characters that distinguish this division from its ally the Gymnolæmata are that the tentacles (or lophophore) are arranged in a horseshoe-shaped line and that the mouth is overhung by a small plate or epistome. The division is a very small one, and all the members are inhabitants of fresh water. There are in England 15 species belonging to five genera; Cristatella, Lophopus and Plumatella are the three best known genera.

Phyllopoda, an order of Crustacea belonging to the sub-class which includes the small, simply organised members of the class, and is known as the Entomostraca. The characters that distinguish this form from the other three orders (viz., Ostracoda, Copepoda and Cirripedia) are that the body is elongated and generally divided into a number of distinct divisions or segments, that there is usually a rounded, shield-shaped or bivalved shell protecting the head and thorax, and several pairs of swimming-feet. The order is divided into two sub-orders, known as the Cladocera, including small forms with a bivalved shell, as, e.g., the water-flea, or Daphnia, and the Branchiopoda. The latter are larger and have numerous pairs of swimming-feet. Most of the Phyllopoda live in fresh or brackish water; thus Daphnia and Apus are fresh-water, the Artemia or the "brine-shrimps" occur in salt lakes and lagoons. Many fossils have been referred to this order. This is unquestionably correct with the numerous species of Estheria, but with the more interesting fossils from the Skiddaw Slate (Upper Cambrian) such as Hymenocaris, it is more doubtful; these are probably to be referred to the Leptostraca.

Phyllotaxis, the arrangement of leaves on the stem of a tree, is of two chief kinds, two or more leaves springing on different sides of the stem from each node, or one leaf only doing so. The first case

is called whorled, the second scattered, or, less accurately, alternate. If whorled leaves spring two from a node, they are termed opposite. The leaves in each whorl commonly stand over the spaces between those in the next whorl below, or decussate. Thus opposite leaves are commonly in four vertical rows, and if one pair point east and west, the next will be north and south, and so on, as in the Mint tribe (*Labiata*), in which this arrangement is commonly accompanied by a square stem. So, too, in the juniper, where there are three leaves in each whorl, there are six vertical rows, or orthostichies, as they are termed. Scattered leaves are variously, but always spirally, arranged. In grasses, for instance, the third leaf, counting from any one, is vertically over the first—i.e., there are two orthostichies, so this arrangement is termed distichous or, strictly, alternate. We can trace a spiral line, the genetic spiral, passing through each leaf in succession; and in this case this spiral will complete one turn round the stem in passing through a cycle—i.e., from any leaf to the next vertically over it—and in so doing will pass through two leaves, or from leaf one to leaf three. If this be projected on a ground plan, the successive nodes represented by concentric circles, and the orthostichies by radii, we shall find any two successive leaves separated by an angular divergence of 180° or half of a circle; so this arrangement is also termed the one-half arrangement. In sedges, on the other hand, the fourth leaf is over the first; there are three orthostichies, and often a triangular stem; the genetic spiral makes one turn, and passes through three leaves in a cycle; and the angular divergence is 120° or $\frac{1}{3}$ of a circle. This arrangement is called tristichous, or the $\frac{1}{3}$ arrangement. In most of the rose and oak tribe the arrangement is pentastichous, or $\frac{1}{5}$, there being five orthostichies, the angular divergence is 144° or $\frac{2}{5}$ of a circle, and the genetic spiral passes through five leaves in a cycle, and travels twice round the stem in so doing. These arrangements, $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{5}$, form a mathematical series, the other terms of which $\frac{1}{4}$, $\frac{1}{6}$, etc., also occur, but chiefly in the close spirals of the scales of fir-cones, which are more difficult to decipher. Other arrangements, not in this series, occur; but rarely.

Phylloxera, a genus of insects of the family Phylloxerinae, allied to the aphides and belonging to the sub-order Homoptera of the order Hemiptera. The species are native to the United States and have the habit of forming galls on the leaves of the hickory, chestnut, oak and other trees, but one species, *Phylloxera vastatrix*, is a veritable scourge of the European vine. This pest would appear to have found its way to France in 1863 and within five years it had spread havoc in the vineyards throughout the south of France. Since that date it has been conveyed to the other vine-growing countries of Europe and has even occurred in the vineyards of the Cape and Victoria. The eggs develop in early summer into two forms of louse, of which one attacks the leaves, the other the roots of the vine. Affected trees exhibit yellowing leaves in the second year, while the tree perishes in the third. Below ground the roots are covered with knots and presently the whole plant sickens, the

roots gradually wither and the tree dies. This little insect pest has cost France especially a colossal sum of money. When the *Phylloxera* appears in vineries and in small yards on level ground, the most effectual cure is to uproot and burn the trees, remove the earth and equip the vinery or yard with brand new plants. Another useful treatment is thoroughly to soak, and keep soaked, the roots and soil with water, since the insect is antipathetic to water. Certain chemical remedies, such as bisulphide of carbon and sulphocarbonate of potassium, are too costly to be employed on a large scale. The best radical treatment for wide areas is to graft the cultivated European vine (*Vitis vinifera*) on the hardy native American stocks. Though the insect does not leave these unassailed, the roots of the American varieties (such as the Taylor, Clinton and Jacques) are too vigorous to succumb to the injuries inflicted. The natural enemies of the *Phylloxera* should also be fostered.

Phylogeny, the science that deals with the history of the development of an organism from its original ancestors. Thus to trace birds back to a reptilian stock, this through a yet earlier amphibian type to an animal without a vertebral column but only a dorsal cord, and thus back to the invertebrata, is to trace the phylogeny of birds. The two principal methods by which this study is carried on are by palæontology or the study of the actual shells or skeletons of extinct animals, and by embryology. The latter is of value, as it is thought that the actual history of the development of an individual (or ontogeny) is a summary of the life-history of its race; or, as it is technically expressed, ontogeny is a summary of phylogeny. This is no doubt correct in the main, but the ontogeny has been so much altered by the development of structures used only for the attachment or nourishment of the embryo, that it must not be too literally accepted. Thus in the larva of the Sea-urchin a series of calcareous rods has been developed forming an easel-like skeleton, whence it is known as a Pluteus. These have been merely secondarily acquired for the support of the larval appendages, and it would be quite erroneous to conclude that a former ancestor of the Sea-urchin resembled the Pluteus stage.

Phylum, one of the main divisions of the Animal or Vegetable Kingdom.

Physalia, or the PORTUGUESE MAN-OF-WAR, is a Hydrozoan and the type of the Physalidæ, a



PHYSALIA.

sub-order of the Siphonophora. The body consists of a large float or pneumatophore, which is bluntly spindle-shaped in form and little less than a foot in length; from this hangs down a series of tentacles and appendages, but these do not include either nectocalyces or hydrophyllia. It lives on the surface of tropical seas, but stray specimens occasionally float into British waters. When touched they sting like a nettle.

Physical Geography. [GEOGRAPHY, PHYSICAL.]

Physicians, ROYAL COLLEGE OF, was founded by Thomas Linacre (1460-1524) in London in 1518. Linacre was a distinguished physician, a fellow of All Souls' College, Oxford, and a fellow-pupil of Angelo Poliziano with the young Giovanni de' Medici who became Pope Leo X. At Padua he took the degree of doctor of medicine with distinction. A consummate master of Greek and held in high repute, the friend of John Colet, Dean of St. Paul's, and teacher of Erasmus and Sir Thomas More, he was appointed physician to Henry VIII. and among his patients were Warham and Wolsey. His most important service to medical science was the foundation of the College of Physicians. Through Wolsey's influence he obtained from the King letters patent granting to himself and others of the faculty in London the right to be incorporated as one body and perpetual community. This secured for the profession a recognised legal status and their College became the model of all similar colleges in the United Kingdom. All persons practising in London and within seven miles were required to be licensed "in the hope that the ignorant and rash practisers be restrained or punished." Linacre, who late in life received priest's orders, was the first President and continued in office until his death. Their meetings were held at his house in Knight-rider Street, in the City, which with his library he bequeathed to the College. Its subsequent homes were in Amen Corner and in Warwick Lane until 1825, when the present building in Pall Mall East was opened by Sir Henry Hallford. Later Acts were passed affecting the College and a new Charter was granted in 1862. As now constituted the College consists of Fellows, by whom the President is annually elected, Members, Licentiates and Extra-Licentiates. The examiners for membership are the President and Censors. The fee for admission as a Fellow or Member is thirty guineas; for a Licentiate fifteen guineas.

Physicians, ROYAL COLLEGE OF, EDINBURGH was incorporated under a Charter from Charles II. in 1681, a new Charter being granted in 1861 with many important provisions. In 1725 the Physicians proposed the foundation of an infirmary for the sick poor in Edinburgh which grew into the present noble institution in Lauriston. Both here and in its original quarters in Infirmary Street the Edinburgh faculty render their services gratuitously. The Asylum for the Insane founded in 1791 (first at Morningside and afterwards at Craiglockhart) was also due to their initiative. By an arrangement made in 1859 with the Royal College of Surgeons, Edin-

burgh (founded in 1505), it is competent for both bodies to hold joint examinations for medicine and surgery, thus providing what is known as the double qualification.

Physics, in its widest meaning, may be defined as knowledge of the order of Nature; and the constancy of this order, proved by experience in every one of Nature's manifestations, is the foundation of all science. In this sense physics should deal with all natural phenomena which have been reduced to scientific form; but gradually there has arisen a division of the subject into natural science and physical science. The former deals with organised bodies and the development of living things; while the latter treats primarily of phenomena in things without life, but continues its investigations among living things when it is seen that the phenomena in question follow the same laws as those applied to unorganised bodies. On the other hand, physics differs from the abstract sciences included in pure mathematics; for the latter is founded upon exact definitions, theorems and laws following each other with complete accuracy and independently of external causes, while such perfect accuracy is impossible in physics, since its laws are founded upon experimental inquiry, and hence liable to errors of observation and measurement. Clerk Maxwell has divided physics into two main groups:—

- I. The fundamental science of dynamics.
- II. The secondary physical sciences, which in their elementary stage are concerned with the deduction of laws founded on experiment and observation of phenomena, with the application of such laws to more complicated varieties of the phenomena; and in their advanced stage are concerned with attempts to show that these laws are the outcome of the dynamical relations of a certain connected system; and, further, they aim at a discovery of the nature of this dynamical system.

According to this definition, very few sciences have got beyond the "elementary" stage, and those which have proceeded farther are only at the lowest of the dynamical stages, of which there may be any number, each rising above the preceding.

Dynamics splits up into two groups—dynamics of a particle and dynamics of a system. Both can be divided into—

- (1) Kinematics, which deals with motion pure and simple, without any inquiry as to its cause.
- (2) Statics, the theory of equilibrium or the balancing of forces so that no motion takes place, which deals with the conditions which must be satisfied so that a body may remain at rest.
- (3) Kinetics, or the study of cause and effect as applied to motion, the amount of motion being found to be proportional to the acting force.
- (4) Energetics, a name given by Clerk Maxwell to the investigation of the forces acting between two bodies and the conditions under which energy is transferred from one to the other.

The dynamics of a system is of enormous import-

ance, since all natural phenomena arise from the actions and reactions between parts of some system. The system may be rigid or fluid, the latter giving rise to the branches of dynamics known as hydrostatics and hydrodynamics as well as those branches which deal with fluid motion and internal forces. Dynamics of a system includes, finally, dynamics of an elastic or of a viscous body.

The secondary sciences are divided by Clerk Maxwell into four main divisions:—(1) Theory of gravitation; (2) theory of the action of pressure and heat in changing the dimension and state of bodies; (3) the theory of radiance; (4) electricity and magnetism. The theory of gravitation is applied to the study of the motions of falling bodies and their weight, and is the basis of physical astronomy, affording a complete explanation of the movements of the heavenly bodies. The theory of the action of pressure and heat deals with—

- (1) The three physical states:
 - (a) Solids, their elasticity, viscosity, plasticity, tenacity.
 - (b) Liquids, their elasticity, viscosity, surface tension, cohesion.
 - (c) Gases, their elasticity, viscosity, adhesion.
- (2) Effects of a rise in temperature on a body; alteration in size and shape or change of state.
- (3) Thermometry or measurement of temperature.
- (4) Calorimetry or measurement of the amount of heat in a body, its thermal capacity and latent heat.
- (5) Thermodynamics, heat as form of energy, transformation of work into heat and heat into work, Carnot's cycle.
- (6) Dissipation of energy by friction, conduction, or the actual removal of high-temperature heat by the scattering of hot particles of matter.
- (7) The propagation of sound, vibrations of strings, rods, plates, and membranes.

The theory of radiance includes the whole science of light and the investigation of radiant heat. Under this head are to be considered:—

- (1) Geometrical optics, reflection and refraction; mirrors, lenses, optical instruments, such as telescopes, microscopes.
- (2) Velocity of light.
- (3) The spectrum, the visible and invisible part; radiant heat; the ultra-violet and chemically-active rays; fluorescence.
- (4) Interference, diffraction, colours of thin plates, Newton's rings.
- (5) The wave theory of light, measurement of wave-lengths.
- (6) Polarisation.
- (7) Radiation from a hot body, measurement of its energy; Prevost's theory of exchanges; rate of cooling.
- (8) The theory of the three primary colours.

Electricity and magnetism are divided into—

- (1) Electrostatics, theory of potential, electrometers.

- (2) Electrokinematics, the distribution of currents in conductors, chemical action in a battery, electrolysis.

- (3) Magnetism, magnetic induction, terrestrial magnetism and its distribution, compasses.

- (4) Electromagnetism, the relation between electric currents and magnetism, the law of the electromagnet.

- (5) Electrodynamics.

- (6) Electro-optics and magneto-optics, rotation of the plane of polarisation of a ray of light, electromagnetic theory of light.

These divisions differ somewhat from those usually followed, but it is a difference in arrangement only. For actual treatment of the sciences the usual arrangement is found more convenient. Although this science of matter and energy should naturally include chemistry, yet the latter is so vast in itself that it takes up a distinct position. That physics and chemistry are nearly allied is shown by the extent to which they overlap in that branch of science known as physical chemistry.

Physiognomy (literally "interpreting of Nature"), the art of judging from the features the character of a man. Aristotle discovered animal likenesses in men, and concluded that man might resemble in character the animal he resembled in feature. Della Porta followed out the same idea in 1586, and it was more largely developed by Le Brun in the 17th century. Lavater endeavoured, with indifferent success, to make it into a science, but Charles Darwin's *Expressions of the Emotions in Man and Animals* (1872) may be regarded as a more rigorous and more exact presentment of the subject. In this connection, too, the exhaustive work on *Mind in the Lower Animals in Health and Disease* (1879), by Dr. William Lauder Lindsay (1829-1880), should be consulted. Physiognomy is said to be of some practical value in studying the life-history of criminals.

Physiography, signifying etymologically a description of Nature, was originally used for that department of geology which deals with the origin of existing surface features—i.e., the science of landscape in its natural rather than its æsthetic sense, including mineralogy. In 1869 Professor Huxley "borrowed the title" for a course of lectures on physical geography treated as "the propædæutic of natural knowledge," as Kant termed it, or as "an introduction to the study of Nature." These were published in 1877, and in the previous year the Science and Art department at South Kensington substituted Physiography for Physical Geography in their examinations. Their conception of the subject included the elementary properties of matter and the forces of Nature, or the elements of chemistry and physics; the nature of the earth's crust, or the elements of geology; the leading characteristics of the sea and the atmosphere, or the elements of hydrography and meteorology; the relation of the earth to other heavenly bodies, or mathematical geography; the constitution of the sun and other stars as revealed by spectrum analysis;

and the evidence as to the nebular hypothesis, or the main conclusions of modern astronomy.

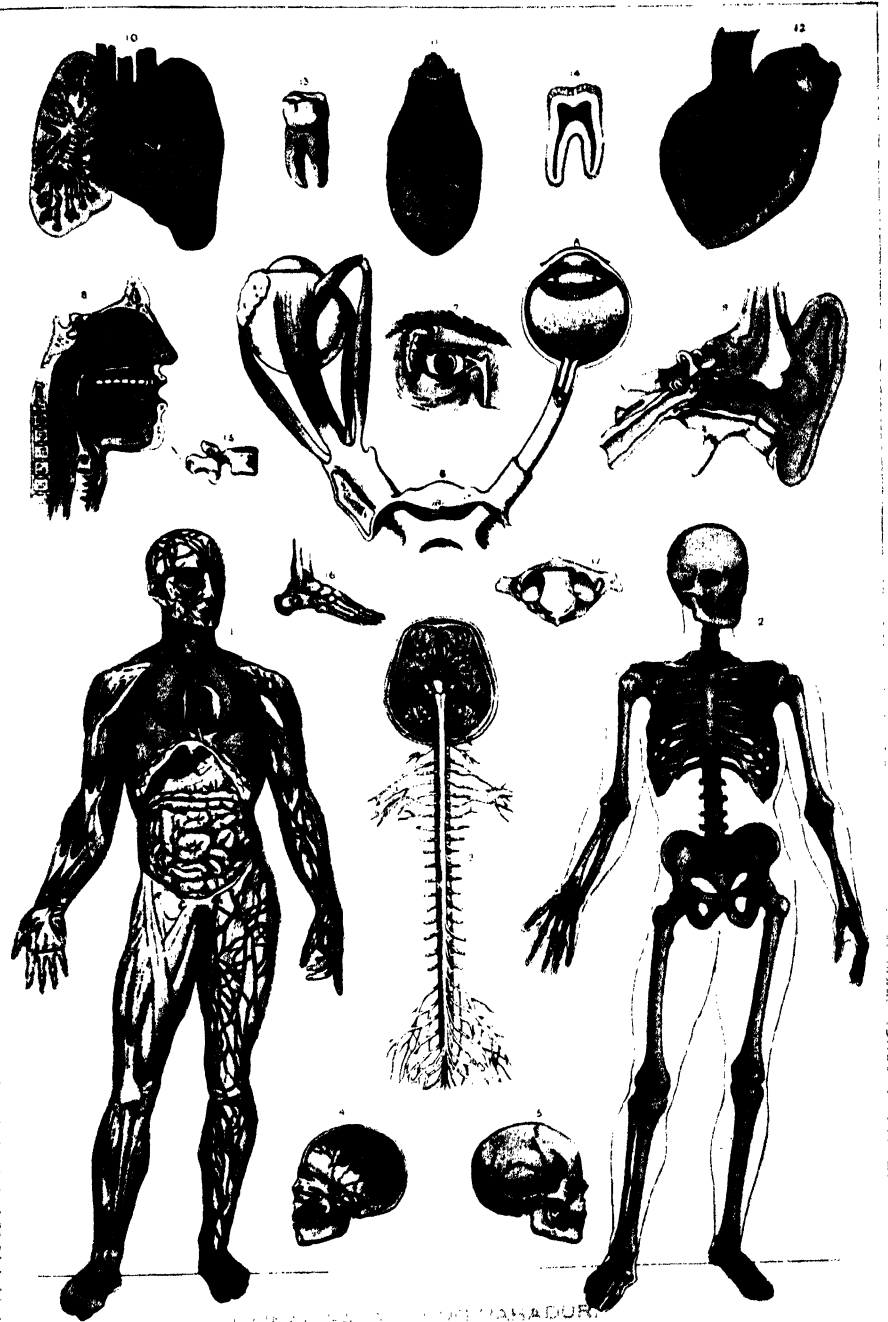
Physiology, the science which deals with the functions of living tissues. The study of the structure of such tissues is the subject-matter of Histology, and their chemical constitution is dealt with by that branch of physiological science known as chemical physiology. Physiology proper is concerned with the functions of the blood and circulatory organs, of digestive, respiratory, secretory, and excretory organs, and those of muscle and nerve. To these must be added the organs of special sense and the subject of reproduction. [BLOOD, HEART, DIGESTION, MUSCLE, NERVE, &c.]

Physiology, VEGETABLE, the science of the functions of living plants. It might be divided, as are the functions themselves, into the physiology of vegetation (i.e., nutrition and growth) and that of reproduction, but has been generally treated rather as a department of general physics, the action of the various forces of Nature upon plants and the reaction of the plants in modifying these forces having been considered in succession. The physiology of vegetation is concerned with the food of plants, its elements, their sources, how they are taken in, and how they are utilised by the plant. The food of plants is ascertained by chemical analysis and by experiments in water-culture as to which ingredients are essential. Plants consist largely of water, which, with various saline substances in dilute solution, is taken in normally by the higher plants from the soil by their roots. Of their dried substance the greater part is carbon, taken in as carbon dioxide from the air by the leaves and other green parts. [ASSIMILATION.] The utilisation of food-substances within the plant, as in the formation of sugars, starch, protoplasm and cellulose, and, still more, later metabolism, are subjects of which we are learning a great deal from year to year by means of the experimental gardens and farms that have been established in different countries. In addition to the matter taken in by the plant, we have here to consider the energy it requires, the minimum, optimum, and maximum heat necessary for assimilation or the various metabolic processes, and the effects of light, electricity, &c. Light is generally essential to assimilation, but not to metabolism. Respiration may be considered as a process subsidiary to assimilation and transpiration and the course taken by water in the plant as part of the metabolic processes. Respiration is now considered as an identical function in every living unit of protoplasm connected with its anabolism and catabolism. Transpiration in the higher plants is performed by means of the stomata and lenticels, and the main course of water in the same plants is the cavities (lumina) of the vascular elements of the young wood. As one of the main results of nutrition, we have next to study the physiology of growth—growth in length and growth in thickness—and here we are largely concerned with the action of various external agencies as stimuli or the reverse, or as affecting the direction of growth. Speaking generally, light retards growth. Questions of symmetry inducing heterauxesis, or inequality of

growth, and of consequent nutation and torsion, arise here, as well as those of geotropism, heliotropism, &c. Reproduction has been described as discontinuous growth, but this very discontinuity marks the great physiological opposition that exists between the vegetative and the reproductive functions; and, though the various methods of vegetative reproduction, by gemmæ, bulbils, offsets, cuttings, &c., are but slightly distinguished from mere growth, the sexual process opens up an entirely distinct series of problems, such as those of alternation of generations, cross-fertilisation, heredity, and hybridism. These are but the chief topics of vegetable physiology. The formation of special secretions, the mechanical relations of resistant structures to strains, irritability, and other movements, and the means adopted for the dispersal of seed, are mainly subsidiary either to nutrition or to reproduction.

Physophoridae, a sub-order of Hydrozoa belonging to the order Siphonophora, including those with a flask-shaped float or pneumatophore, and with two or more rows of the modified individual polypes forming the structures known as nectocalyces, hydrophyllia, and hydrocysts. In the most typical genus *Physophora*, these are borne on a long stem, but there are no hydrophyllia. The members of the group are all marine, and live swimming on the surface of the sea, far from land, in tropical and sub-tropical regions. No fossil representatives are known.

Piacenza (Latin, *Placentia*), capital of the province of the same name, Italy, on the right bank of the Po, near its confluence with the Trebbia, 36 miles W.N.W. of Parma. It is situated in a fertile plain half way between Parma and Milan. It is now, as it was of old, of military importance. The chief buildings are the Lombardo-Gothic cathedral of the 13th and following centuries; the Church of Sant 'Antonio, occupying the spot where St. Barnabas is traditionally said to have preached; the Church of San Francesco, where (1848) the deputies of Piacenza announced their adhesion to the house of Sardinia; the Church of San Sisto, perpetually impoverished when the monks sold Raphael's *Sistine Madonna*, now in Dresden, in 1754; the 13th-century Town Hall; the Farnese Palace, designed by Vignola for Margaret of Austria (1558), never finished, and at last utilised as barracks; the old and new Episcopal Palaces; the great theatre (1803); the Laudi Library (1846); the Passerini Library (1685), and the Collegio Alberoni for the education of priests and missionaries (1751). In the Piazza dei Cavalli, in front of the Town Hall, are Francesco Mocchi's equestrian statues of Alessandro Farnese, Duke of Parma, and his son Ranuccio, which give to the square its name. The principal manufactures include woollens, cottons, silks, paper, pottery, leather and hats. Piacenza became a Roman colony in 219 B.C., and suffered a great deal at the hands of invaders and others at various times (Carthaginians in 218 and 207, garrison mutinies in the 1st century B.C., and the Goths in the 6th century). It was, in the 12th century, a prominent member of the Lombard League, was sacked by Francesco Sforza in 1447, and, in 1545, was combined



HUMAN BODY AND ITS PARTS.

1. THE HUMAN BODY WITH THE ANTERIOR WALLS OF THE CHEST AND ABDOMEN REMOVED. IN THE LEFT ARM AND LEG THE SUPERFICIAL VEINS ARE SEEN. IN THE RIGHT ARM AND LEG THE DISSECTION HAS BEEN CARRIED FURTHER SO AS TO EXPOSE THE MUSCLES.
2. HUMAN SKELETON
3. THE BRAIN FROM BELOW AND SPINAL CORD
4. THE INNER ASPECT OF THE RIGHT SIDE OF THE HUMAN SKULL
5. OUTER ASPECT OF THE SAME
6. THE EYEBALL. A. SECTION. B. MUSCLES
7. THE RIGHT EYE SHOWING: A. LACRIMAL GLAND B. LACRIMAL DUCT
8. VERTICAL SECTION SHOWING: A. MOUTH B. NASAL PASSAGES C. PHARYNX AND D. LARYNX
9. THE EAR
10. HEART AND GREAT VESSELS AND LUNGS
11. THE TONGUE
12. THE INTERIOR OF THE LEFT SIDE OF THE HEART
13. LEFT AURICLE. 14. LEFT VENTRICLE
15. TOOTH
16. VERTICAL SECTION OF TOOTH
17. VERTEBRA - SIDE VIEW
18. BONES OF THE FOOT
19. THE ATLAS - VERTEBRA

with Parma to form a hereditary duchy for Pierluigi Farnese. Lucius Calpurnius Piso (Julius Cæsar's father-in-law) and Pope Gregory X. were natives. Pop., 36,064.

Pia Mater, the delicate fibrous and very vascular membrane which immediately invests the brain and spinal cord, supports the blood-vessels that nourish the brain, and contains the fluid that carries away the products of brain waste and serves as a buffer-like bag to lessen the effect of outward shock. This and the external membrane (the dura mater) were so named from the notion, more or less hazy, that somehow they produced the brain.

Pianoforte, a musical instrument which in its simplest form may be described as a dulcimer fitted with keys. It succeeded in point of time the



GRAND PIANOFORTE.

(Decorated by T. G. Jackson, R.A.)

harpichord, from which it differed in the fact that the sounds might be modified in intensity. Hence arose its name, which means "soft-loud." The construction of the piano is at the present day so familiar to everyone that it is needless to describe it beyond saying that the keys when struck set in motion levers which cause the hammers to strike the one, two, or three strings that produce the notes, that intensity is produced by the action of a pedal which raises the dampers, and the soft effect by a pedal which shifts the action so that the hammer strikes only one or two wires instead of three, as the case may be. The two principal varieties of piano are the Grand, in which the strings are placed horizontally, and the Upright, in which they are arranged vertically. Fresh modifications and varieties of these and improvements in details are constantly being introduced. The piano, which was introduced into England towards the end of the 18th century, is said to have been manufactured by Bartolommeo Cristofori, of Padua, in 1710. In 1716 a Frenchman produced three models, and he was followed in 1721 by the German manufac-

turer Schröter. The instruments of German and English make are renowned for their beautiful tone and other qualities.

Pianola. The earliest form of the mechanical piano-player appears to have been the Piano Mécanique invented by M. Debain about 1850. By an ingenious apparatus he applied a second set of hammers to the ordinary instrument which worked from above and were set in motion by iron levers. The action of the familiar street handle-piano, which has ousted the wheezy barrel-organ, is due to the pin of the barrel pressing down a crank which strikes the note, a spring causing the return of the hammer. In 1863 the first pneumatic keyboard piano-player was patented in France by M. Fourneux. A large number of inventions were afterwards patented in the United States, the first complete automatic piano-player being the Angelus in 1897. The Pianola, patented in 1898, the Claviola, and others whose variations are not conspicuous have since followed. Their general principle is a pneumatic chest, a fulcrum bar, finger-levers, bellows and pedals, the whole being contained in a movable cabinet. A tracker adjusts the perforated music-roll, which a pneumatic motor propels over a scale-block provided with small openings corresponding to the scale. When a perforation passes over an opening in the scale-block the note is struck. The finger-levers overhang the keyboard, being worked by small pneumatic bellows which derive their power from the main bellows, which are filled by pedalling. The operator regulates the time and marks of expression at will. The ingenuity and correctness of these instruments are remarkable, but, of course, they can never be a substitute for the performance of an artist.

Piaroas, South American aborigines, whose territory lies on both banks of the Orinoco between San Fernando de Atabapo and the confluence of the Sipapo, a righthand affluent of the Orinoco in Venezuela (about 5° N.); a few are also met with in the Sipapo Valley, and about the head-waters of the Orinoco. They are a timid, superstitious people, carefully avoiding all the settled districts and keeping entirely to the recesses of their trackless woodlands. They build large and carefully constructed conic houses 30 to 40 feet in diameter, 20 to 25 feet high, and roofed with palm-thatch which resists the torrential tropical rains for years. The Piaroas, who are a stout, vigorous people, of very dark brown complexion, believe in a kind of metempsychosis, according to which all members of the tribe descend from tapirs and after death revert to the tapir state, while other peoples are similarly related to other animals.

Piastre ("thin plate of metal") was the name applied to the Spanish dollar of the 17th century, which was also called peso, and had a value of about 4s. 4d. of English money. The Italians adopted it in imitation of Spain. In South America the name peso is still retained. The name piastre is now used by other nations to denote the unit of Turkish currency, and it is worth in Turkey 2d., in Egypt 2½d.

Pibroch (a transliteration of the Gaelic word for bagpipe music), a musical composition for the Highland bagpipe of Scotland. It comprises a number of variations (usually three or four) on a theme or air called the urlar, the last of which passes into a concluding quick movement. Ordinarily the variations increase in complexity and speed and, according to the piper's skill, may be adorned with grace-notes or "warblers," introduced with great effect. Pibrochs are usually martial in character and are exceptionally adapted for marching tunes; but it is quite a mistake to regard them as dirges or laments, for these are the attribute of the Coronach. Pibrochs are commonly named after a person or event. The "Fàilte Phroinsa" ("The Prince's Salute"), for example, was composed by John MacIntyre, the piper of The Menzies, on the landing of the Old Pretender at Peterhead in 1715. The "Raid of Kilchrist" was composed by Macdonald of Glegarry's piper in 1603, while a church, along with the worshippers, was being destroyed by fire. In his "Pibroch of Donuil Dhu" (Black Donald) Sir Walter Scott employs the word as a synonym for the bagpipe—an exceptional usage, however.

Picardy, an old feudal province of France, bounded on the N. by Artois, Flanders and the English Channel, on the E. by Hainault and Champagne, on the S. by Ile de France (this province being called an island because it was enclosed by the rivers Seine, Marne, Aisne, Oise and Ourcq) and on the W. by Normandy and the English Channel. It is now represented by the department of Somme and part of those of Pas-de-Calais, Aisne, Oise and Nord. The name does not occur before the 13th century, but under the Romans the territory was occupied by Belgian tribes, some of whose names still appear in place-names, such as the Ambiani (Amiens), Veromandui (the Vermandois), Bellovaci (Beauvais) and Suessones (Soissons). After passing into the possession of the Counts of Flanders, Picardy was annexed to France by Louis XI.

Piccolo (Italian, "little"), a small flute, sounding an octave higher than the ordinary flute, its full name being Flauto piccolo. It is also called Ottavino. Excepting the higher harmonics of the violin, the notes of the piccolo are the most acute of any instrument in the orchestra. It was a particular favourite with Berlioz. Beethoven employed it to represent the whistling of the wind in the storm of the "Pastoral Symphony," while in his accompaniment to the bass song "Oh! ruddier than the cherry," Handel made extraordinarily effective use of the piccolo, where its qualities exactly suited the pastoral nature of the theme and scene. It has been freely used by many composers.

Piccolomini, a distinguished Siennese family, though originating in Rome, which reckoned among its members the scholarly Æneas Sylvius, Pope Pius II. OTTAVIO PICCOLOMINI, Duke of Amalfi, born at Florence on November 11th, 1599, passed from the Spanish service into that of the Emperor Ferdinand II., and played a distinguished part in the

Thirty Years' War, contributing to the victory of Nördlingen (1634), expelling the French from the Netherlands (1635), and saving Austria from invasion by a Swedish host under Banér (1640). After a defeat by Torstenson in Silesia (1642), he re-entered the Spanish service, and was appointed commander-in-chief in the Netherlands. He died at Vienna on August 10th, 1656.

Pichegru, CHARLES, general, was the son of a labourer of Arbois in the department of Jura, France, where he was born on February 16th, 1761. He entered an artillery regiment in 1783 and, showing exceptional capacity on the outbreak of the Revolution, was placed in command of the Army of the Rhine, and reconquered Alsace (1793). Receiving the command of the Army of the North in February, 1794, he within a year conducted three brilliant campaigns, the first of which was terminated by his victory over the Austrians at Fleurus (June 27th), the third by his entry into Amsterdam (January, 1795) and occupation of the whole of Holland. He was recalled to Paris two months later, and crushed a rising of Sansculottes against the Convention. He now returned to the Rhine; but, in spite of his great popularity, he began to intrigue for the return of the Bourbons. His treachery became known, and in December, 1795, he was superseded by Moreau. As member and afterwards president of the Council of Five Hundred, he still endeavoured to promote the interests of the Bourbons, and was in consequence deported to Cayenne (1797). He escaped to England and there met Georges Cadoudal, whom he joined in his abortive attempt to assassinate Napoleon. Betrayed by a friend, Pichegru was imprisoned in the Temple, Paris, where on the morning of April 5th, 1804, he was found strangled. His death was probably self-inflicted, but at the time it was attributed by the Royalists to Napoleon.

Pickering, a town of the North Riding of Yorkshire, England, 15 miles W. by S. of Scarborough. The restored church of St. Peter in the Norman, Transition and later styles contains several interesting features, amongst which are several effigies of knights and a series of frescoes of the 15th century occupying the space, on both sides, between the nave arcades and the clerestory windows: the wall pictures had been whitewashed, but were carefully uncovered and repaired. On high ground north-west of the town stand the ruins of the castle which, judging from the remains and the area they cover, must have been a massive and important stronghold. It was probably a Norman fortress erected on earlier earthworks. King John was an occasional visitor, while Richard II. was a prisoner until he was removed to Pontefract. The manufactures include the making of agricultural implements, besides iron-founding, brickfields and quarries of limestone and freestone. Pop. (1901), 3,491.

Pico della Mirandola, GIOVANNI, "the Phoenix of his age," was born on February 24th, 1463. He was the youngest son of Giovanni Francesco Pico, Prince of Mirandola (a

small territory afterwards incorporated in the province of Modena, Italy). In his childhood he displayed marvellous precocity, and the narrow round of instruction in the university of Bologna drove him forth in disgust to seek out new paths of learning as a wandering scholar in Italy and France. Arriving at Rome after about seven years, he issued a list containing nine hundred propositions which he offered to maintain against any antagonist (1486). Some of these being deemed heretical, he published an *Apologia*, but his orthodoxy remained doubtful till Pope Alexander VI. issued a brief in his favour in 1493. The latter part of his life was spent chiefly at Florence, where the influence of the humanists, Politian and Ficinus, was counteracted by that of Savonarola, and where he died on November 17th, 1494. His views became more and more austere, and it is probable that if his life had been prolonged he would have joined the preaching friars.

Picotee, that group of florists' varieties of the carnation (*Dianthus Caryophyllus*) in which the edges of the petals are "laced" or edged with a distinct colour, the rest of the petal having a white, yellow, or other ground. In the earlier usage the picotee petal had a white ground spotted or dusted over with the secondary colour. The word is said to be derived from the French botanist Philippe Picot, Baron de la Peyrouse (1744-1818).

Picric Acid. [CARBAZOTIC ACID.]

Pictet, RAOUL, chemist, was born at Geneva, Switzerland, in 1842. For many years he was professor in the university of his native town, but was especially noted for his experiments resulting, in 1877, in the liquefying of oxygen, which had till then been supposed to be permanent. His chief works are *Mémoire sur la liquéfaction de l'oxygène, la liquéfaction et la solidification de l'hydrogène, et sur les théories des changements des corps* (1878); *Synthèse de la chaleur* (1879); *Nouvelles machines frigorifiques* (1885); *Étude critique du Matérialisme et du Spiritualisme par la physique expérimentale* (1896); *l'Acétylène* (1896), and *le Carbide* (1896). By one of those interesting coincidences of which Science furnishes her fair share Louis Paul Cailletet, an eminent French physician, by independent research and an entirely different method, succeeded in liquefying oxygen a few days before Raoul Pictet achieved a similar result.

Picton, SIR THOMAS, general, was born at Poynton, Pembrokeshire, Wales, in August, 1758, and entered the army as an ensign in the 12th in 1771. He exchanged into the 75th, was promoted captain in 1777 and, his regiment having been disbanded in 1783, spent the following twelve years at the family place in Pembrokeshire. He was ordered to the West Indies in 1794, and became Governor of Trinidad in 1797. He resigned this position in 1803, and during the next few years was engaged in meeting certain charges preferred against him for cruelty during his tenure of office. He was placed on trial and practically cleared. Promoted major-general in 1808, he commanded a brigade in the Walcheren expedition (1809), and was appointed Governor of Flushing. During the Penin-

sular War he commanded the "Fighting Division," distinguishing himself especially at Budajos (1811) and Vittoria (1813). He was severely wounded at Quatre Bras, but concealed the fact in order that he might take part in the battle of Waterloo, in which he was killed by a musket shot (June 18th, 1815).

Picts, an ancient race who formerly inhabited a great part of Scotland, and whose origin and affinities have long constituted a vexed ethnological question. It has been much disputed whether they were of Teutonic or Celtic origin, and even as to their name it is doubted whether it is from the Latin *Picti*, given them by the Romans in reference to their habit of painting their bodies, or whether they called themselves thus. One authority (John Pinkerton) makes them Scythians from the neighbourhood of the Danube; but it seems more probable that they were of Celtic stock, especially when we consider that at a later period they readily amalgamated with the Scots. Their language evidently differed from the other dialects of Scotland, since we find that St. Columba needed an interpreter when speaking to them. The Picti are mentioned by the Romans in A.D. 296, and again in 360, as inhabiting that part of Scotland which lies north of the Forth and Clyde, with the exception of what is now Argyll and was then inhabited by Dalriadic Scots from Ireland. The Grampians separated the Northern from the Southern Picts, the latter of whom became much mixed up in Northumbrian affairs. The Northumbrian rule was established over the Southern Picts in the early part of the 7th century, but in 685 the Picts conquered Egfrid and gained the upper hand. Their king, Nechtan (d. 732), founded the monastery of Abernethy, and was beaten by Angus Macfergus, who succeeded him and conquered the Northern Picts and the Scots of Argyll. Later, however, these Dalriadic Scots obtained the ascendancy, and under their supremacy an amalgamation of the peoples was brought about.

Picts' Houses, rude underground dwellings in certain of the northern, north-eastern and southern counties of Scotland, popularly supposed to have been excavated by the Picts. They are more properly designated cird or earth houses. Saying that they were made below the surface of the ground, they were analogous in their simplicity of structure and also in respect of their date to the beehive dwellings found in parts of Ireland and the Western Highlands and islands of Scotland. These dwellings were circular in plan and built of undressed stone, the long blocks being so laid that each course overlapped the one beneath it, the resulting hut presenting a rough resemblance to a beehive, from which feature this popular name was derived. The brochs or round towers, remains of which occur in Orkney and Shetland and also on the Scottish mainland, have also been styled Pictish Towers.

Picture Post-cards. [POST-CARDS, PICTURE.]

Piddock. [PHOLADIDÆ.]

Pidgin English, i.e., "Business English," ("pidgin" being the Chinese attempt to pronounce the word "business"), a sort of jargon or *lingua franca* serving as the medium of intercourse between the natives and the English and other white traders on the Chinese seaboard. The words are mainly English in a more or less mutilated form, the structure Chinese; hence it is at first quite unintelligible even to those well acquainted with both languages. In recent years this jargon has penetrated inland, and is now often used as a means of communication between the natives of the provinces of Kwangtung and Fokien, whose respective dialects differ so greatly as to be mutually unintelligible. A similar Russian jargon has become current amongst the compradors or Chinese commercial agents of Kalgan on the Mongolo-Chinese frontier. The alternative name of "Pigeon" English is erroneous and wholly misleading.

Piece of Eight, a coin, the Spanish *peso duro* ("hard dollar"), which was of the value of 8 reals and bore the numeral 8. It is said that the commercial sign of the dollar—\$—was derived from this 8, the two upright strokes standing for the Pillars of Hercules, formerly stamped on some dollars. On the other hand, some aver that the \$ was derived from the stamp 8 R (8 reals) itself. From Daniel Defoe to Robert Louis Stevenson (and no doubt till the vogue perishes) the writers of adventure books and buccaneering stories make free play with "pieces of eight."

Piedmont, a compartment or division of Italy, situated S. of Switzerland, W. of Lombardy, E. of France, and bounded on the S. by the provinces of Genoa and Porto Maurizio. It lies at the foot of the Alps—hence its Italian name, Piè di Monte, "foot of the mountain"—having the Lepontine and Pennine Alps to the north and north-west, the Graian and Cottian on the west, the Maritime Alps and the Apennines to the south. It covers an area of 11,340 square miles. There is a gradual descent from the mountains to the valley of the Po, and the district is wonderfully fertile. The Po receives many tributaries within the territory, including the Maira, Tanaro, Scrivia, Ticino and others, and these are much used for the purpose of irrigation. Wheat, maize, rice, beans, hemp, hay, vines, olives and other fruits are largely cultivated, and the province produces wine, cattle and millions of silkworms. Iron, lead, copper and marble are worked; and there are manufactures of silk, woollens, cotton and flax. Grain, cotton, silks, hides, flax, wine and wool are exported. Turin is the capital, and was from 1860 to 1865 the capital of the new kingdom of Italy. The Waldensian Church still exists in the mountainous districts. Pop. (1901), 3,326,311.

Piepowder Court, a court formerly held at a fair on St. Giles's Hill, near Winchester, in England, authorised by the bishop through a grant from Edward IV. It afterwards became a feature of every fair and market and was constituted for the immediate trial of all and sundry accused of unfair dealing or other wrongdoing and especially of such

pedlars, hawkers, rogues and vagabonds as required to be compelled to fulfil the contracts they made at the fair. It was called the Court of *Pied poudreux* ("Dusty Foot") in obvious allusion to the appearance presented by most of the delinquents, though, according to Blackstone, Sir Edward Coke derived its name from the circumstance that justice was done "as speedily as the dust can fall from the foot." In any case it was only a summary court, its functions beginning and ending with the particular fair where it was held, and was usually presided over by the steward of the manor or the receiver of the toll dues. Its jurisdiction ultimately passed to the petty sessions.

Pierce, FRANKLIN, 14th President of the United States, was born at Hillsborough, New Hampshire, on November 23rd, 1804. He was educated at Bowdoin College, Brunswick, Maine, and, for the law, at Northampton, Massachusetts, and with Judge Parker at Amherst. He was admitted to the Bar in 1827, and six years later was elected to Congress, where he attached himself to the Democratic party. He was a member of the Senate from 1837 to 1842, and afterwards served in the Mexican War (1846-7). His election to the Presidency took place in 1852. He was a firm and conscientious believer in slavery, and excited a very strong feeling among the Free State party by approving the repeal of the Missouri Compromise and the Nebraska-Kansas Act for the organisation of Nebraska and Kansas as slave territories. Jefferson Davis was his Secretary of War. During the Civil War his sympathies were wholly with the South. He died at Concord, New Hampshire, on October 8th, 1869.

Pieria, a coastal district in the extreme north of ancient Thessaly, partly extending into Macedonia. It contains Mount Olympus and was famous for a well, on Mount Pieros, near which the Muses were reputed to have been born. Hence they were called Pierides, and hence also arose such allusions in literature as that in Alexander Pope's *Essay on Criticism*:—

A little learning is a dangerous thing,
Drink deep, or taste not the Pierian spring.

Pietà, the Italian form of the Latin *pistis*, signifying piety tempered with or proceeding from affection, gratitude, compassion. Hence in Art the word has come to be applied to paintings chiefly by the Old Masters and mostly of the various Italian schools in which the Mother is represented with the crucified body of her Son. Such pictures were usually in request as pendants or companions to those of the Madonna holding in her arms the infant Jesus.

Pietermaritzburg, or MARITZBURG, called in full after its founders (1839), the Boer leaders Pieter Retief and Gerhard Maritz, the capital of Natal, South Africa, on a plateau near the Umgeni, 54 miles N.W. of Durban, with which it is connected by a railway. It has also railway communication with the Orange River Colony and the Transvaal. It is a pleasant, prosperous town, with

broad streets shaded by trees, and stands at an altitude of 2,225 feet above the sea. The chief buildings are the Legislative Assembly Hall, Government House, two cathedrals, the Town Hall and the museum. Pop. (1901), 30,000, of whom half are whites, the other half being Kaffirs and Indian coolies.

Pietism, the principles of the Pietists of the 17th century in Germany, who advocated a more practical type of piety and the participation of the laity in the spiritual work of the Church, in order to revive the declining devotion of the Lutherans. Their leader was Philip James Spener (1635-1705), who pleaded for a more thorough and more earnest study of the Bible, greater tolerance towards unbelievers, and a more actual style of preaching. As time went on, extravagances manifested themselves among the reformers and the term "Pietist" came to be applied by way of reproach to those who yielded unduly to mere emotionalism and sentiment as distinguished from an intelligent belief and the daily practice of the tenets of the Sermon on the Mount. In this sense Pietists were not confined to Germany.

Piezometer (Greek, *piezein*, "to press"; *metron*, "measure"), an instrument which measures the compressibility of a fluid. If a pressure of p pounds per square inch be applied throughout a liquid whose volume was originally v cubic inches, it will cause this volume to diminish. If the final volume is $v - v'$ cubic inches, the compressibility is

$\frac{v'}{v}$. A piezometer is provided with arrangements for measuring v and p . The best-known form of the instrument is that devised by Oersted, and it was by means of this that the compressibility of water was first determined with any accuracy. A large bulb provided with a small capillary tube contains the liquid whose compressibility it is required to measure, while a drop of mercury at the top of the liquid in the tube acts as an index. The capillary is graduated and is open at the top. The whole of this apparatus can be placed inside a large strong glass cylinder, into whose neck a piston tightly fits. This cylinder is filled with water, and a great pressure can be produced throughout its volume by a downward thrust of the piston. Under this increased pressure the experimental liquid is seen to descend in its capillary tube, and the amount of descent is indicated by the bubble of mercury. Previous experiments having determined the value of each graduation on the tube in terms of the total contents of the bulb, the descent of the index measures the decrease of volume (v') which the liquid has suffered. The pressure p may be measured by placing a graduated cylinder of air inside the large vessel. The water will from the first rise some distance in this vessel, and as the pressure is increased the volume of contained air will become visibly less. By suitably graduating this cylinder the increased pressure can be read off. Knowing v , the original volume of our experimental liquid, and having measured p and v' , we can determine the required compressibility. An air bubble in the capillary tube is often used as an index

instead of the mercury, in which case the liquid must fill the bulb and tube almost to the top. The bubble, whether of air or mercury, prevents the water in the outer vessel from coming into contact with the liquid in the tube. Allowance has to be made for the diminution in volume of the bulb itself under the increased pressure.

Pig, HOG, an animal belonging to the family Suidæ, of the Artiodactyla or even-toed division of Hoofed Mammals, and confined to the Old World. The snout, with which these animals turn up the ground in search of roots, worms and insects, is elongated, and the nostrils are placed in the flat surface at its end. There are four digits on each limb, the third and fourth functional, while the outer ones (the second and fifth) do not reach the ground. In the type-genus *Sus* the dentition is $i \frac{3}{1} c \frac{1}{1} p \frac{4}{1} m \frac{3}{1} = 44$. In the males the canines are developed into tusks. The body is covered with hair, generally in the form of bristles. [BOAR.] The pig (*Sus scrofa*) has been greatly changed by domestication, which took place at an early period, and it has run into many breeds, those being most valued which fatten readily, covering a small frame with a good yield of meat, and are prolific. The flesh, fresh or cured, is almost universally eaten for food, except by Jews and Mohammedans, to whom it is forbidden by their sacred writings (Lev., xi. 7; Koran, ch. ii.). [BRAWN.] The fat is rendered down into lard; the skin is used for saddlery; the bristles are worked up into brushes and employed by shoemakers to point their threads. From its omnivorous habits the pig is profitable to keep, for it will devour almost anything—though offal and garbage should not be given, as these would taint the flesh, or at the least give an unpleasant flavour; and if turned out into fallows, stubble, or woods the

animal shows a marvelous faculty for picking up a living. The pig is often reproached with want of intelligence, and with being dirty. Wild pigs are anything but stupid; and "learned" pigs show that the domesticated form is capable of being trained. The charge of being dirty is equally baseless. Pigs like to wallow in the

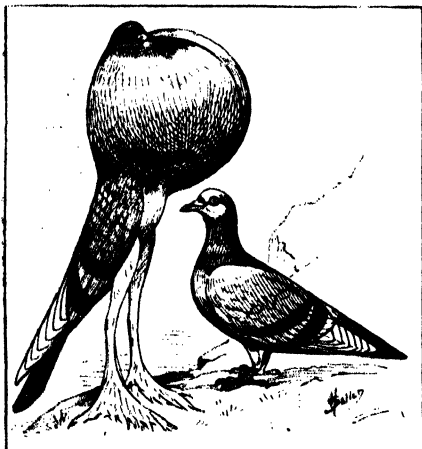


HEAD OF WART HOG.

mud, and to cover themselves with it; so do buffaloes, and the reason in both cases is the same—protection is sought against insect pests. The Indian Pigmy Hog (*S. salrianus* = *Porcula salriana*), from the forest at the base of the Himalaya, Sikkim and Bhutan, stands a little less than a foot high at the shoulder, and an old male, twenty-six inches from snout to rump, weighed but 17 lbs. The Bush Hogs or River Hogs constitute the genus or sub-genus *Potamochoerus*. There are two species, the South African River Hog (*P. africanus*), the Bosch-vark of the Dutch colonists, in which the coloration is grey; the West African Red River Hog (*P. porcus*), of a

reddish hue, and having the ears greatly elongated, and tipped with a tuft of hairs. There is usually one premolar less on each side than in the Boar. Their young, as well as those of the Pigmy Hog, show the stripes which are so marked in the young of the Wild Pig. In those of the Babirusa and of the Wart Hog, this character is absent. The Wart Hogs are African in their habitat, and constitute the genus *Phacochoerus*. The snout is broad and flat, and has none of the flexibility that marks the snout of the Common Pig. The skin of the face is wrinkled, and on each side are large wart-like projections. The upper canines are larger than those in the lower jaw, and curve upward in the same direction. These tusks are present in both sexes. There are two species, Alian's Wart Hog (*P. alianus*), ranging nearly over the continent, and Pallas's Wart Hog (*P. athiopicus*), confined to the south-east.

Pigeon, DOVE, a name often applied to any Columbiform bird, sometimes restricted to individuals and species of the type-genus (*Columba*) of the group. These have the bill moderately long, somewhat arched at the tip, and the upper mandible is covered at the base with skin, in which are the nostrils; there are three toes in front, divided to the base, and one behind; the wings are pointed, and the tail is generally square at the end. Pigeons, in the wider sense of the word, are widely distributed, but are most abundant in the



POUTER AND ROCK PIGEONS.

Australian region, where about half of the known species are found. They are very prolific and rear several broods (never more than two in each) during the year. In the wild state they are said to pair for life, and the male bird takes his share in sitting, and in feeding the young. The origin of all the domestic breeds is the Rock Pigeon (*C. livia*), found nearly everywhere throughout the Old World. The total length is about thirteen inches; the general plumage light bluish-grey, with two black

bands on the wings and the throat and sides of the neck glossed with metallic reflections of purple-red and green. These birds live chiefly on grain and seeds, and do considerable damage to gardeners and farmers. The only other British species are the King Dove, Wood Pigeon, or Cushat (*C. palumbus*), in which some of the neck-feathers on each side are tipped with white; and the Stock Dove, or Smaller Wood Pigeon (*C. uenas*), which has no white on the neck. The name Pigeon, with some distinguishing epithet, is used for other groups of Columbiform birds, as the Ground Pigeons, Fruit Pigeons, Tree Pigeons, etc. Fancy pigeons afford one of the best examples of what may be done with domesticated animals by judicious selection on the part of the breeder, so as to perpetuate and intensify some variation. Among the chief breeds valued by fanciers are the Homing Pigeon, Carrier Pigeon and the Barb, so-called because it came originally from Barbary, with its beak and eyes wattled. Another wattled pigeon is the Dargoon, from which the Carrier was developed. In the Pouter the crop is abnormally large and round, and so raised to the front that the beak is hidden. The Jacobin has the head and neck so covered with feathers as to present a distant resemblance to a monk with his cowl. (Jacobin is the old French name for a Dominican friar.) Other varieties are the Tumblers, which are so named from their habit of turning somersaults backwards during flight; Fantails, which spread out the tail-feathers like a fan, something like those of a turkey cock in his display, but without trailing the wings; the Satinetstes and Turbites, which belong to the group of Oriental Frilled Pigeons—down the breast extends a frill of feathers, and the head may be plain or crested.

Pig-Iron. [IRON.]

Pigments are the raw materials from which paints are prepared. They differ therefore from paints in that the latter are prepared with the aid of a vehicle or medium. In a paint the pigment must be insoluble in its medium, whilst in the preparation of a dye the pigment should be soluble. There are many properties belonging to pigments that must be carefully considered before their conversion into oil-paints. It is of primary importance that the pigments selected for the preparation of a particular colour should have no chemical reaction one with the other or with the medium used. Pigments differ in consistency, and are therefore spoken of as opaque or transparent. Many pigments are affected by exposure to light and air, and by changes of temperature. Consequently care must be taken to avoid the use of such pigments. Again, some pigments dry very slowly and some irregularly. It is important that a pigment should dry completely throughout and not merely on the surface. Although but few chemical elements enter into the composition of pigments, a very great variety of colours is produced. Many pigments, though beautiful in colour, are useless, as they possess great physical drawbacks. Bitumen or asphaltum is very susceptible to change of temperature, and liable actually to move on the canvas. The



PIGEONS.

- 1 Homing Pigeon. 2 Tumbler. 3 Carrier. 4 Barb. 5 Pouter. 6 Fantail. 7 Satinette. 8 Turbiteen.
 9 Jacobin. 10 Trumpeter.

disastrous effect of this may be seen in the paintings of Sir David Wilkie, Sir William Boxall and many other artists. Examples will readily be found in the National Gallery in London, and other collections. Some pigments occur naturally as earths, others are of artificial production, being prepared by chemical means, whilst others are extracted from plants, as bistre and iris blue; and yet others from insects, as carmine. After a careful examination and selection of the raw material the pigment is washed with water, and then finely ground with its vehicle by means of a number of granite rollers which revolve by steam power. All the native earths contain water and should therefore be gently dried before grinding. Many pigments require several hours grinding. Pigments are usually ground in spirits of turpentine, or alcohol, but if for oil-painting the vehicle used is either linseed or poppy oil, the latter being more often employed. Distilled water is frequently used for the washing of pigments in order that all impurities of a saline nature may be removed. It is, however, necessary to use other solvents in the treatment of certain pigments, such as Prussian blue, cadmium, viridian, and the lakes; thus, carbon bisulphide is used to extract free sulphur from cadmium yellow. Heat is used in the preparation of some pigments, such as yellow ochre, and ivory-black. These are slowly dried at a temperature less than the boiling-point of water; whilst other pigments, such as light red, burnt sienna and burnt umber, are prepared by the calcination of yellow ochre, raw sienna, and raw umber. In the preparation of water-colours gum water and glycerine are used.

White pigments may consist of a number of different compounds. Amongst these some of the most common are lime, used as a coarse whitewash for walls, ceilings, etc.; white lead, one of the most common of all pigments, although it blackens if exposed to sulphur fumes and has certain dangers in its preparation; zinc oxide or Chinese white; and permanent white, which consists of sulphate of barium either natural or, better, prepared artificially. Flake white is a mixture of carbonate and hydrate of lead. It is largely used in oil-painting, being of a very good body and with great covering power. It has a slight tendency to become yellow with age or on exposure to gases containing sulphur. It owes its name to the fact that the white pigment falls in flakes from the corroded metallic lead during the course of its manufacture.

Black pigments are usually more or less impure forms of carbon obtained by heating various vegetable or animal substances, and indicating by their names the source whence they are obtained, as *e.g.*, ivory-black (a bad drier as an oil-paint), bone-black, lamp-black, etc. Oxides of manganese are also used, and aniline black; while tar is also frequently employed for painting wood, etc., possessing a powerful anti-corrosive action.

Yellow pigments consist chiefly of oxides of iron and some salts of chromium and lead. The first class constitute the pigments known as ochres, varying in shade from yellow to brown, according to the quantity and nature of the oxides of iron

contained. Chromates of strontium and lead form valuable yellow pigments, while a compound of lead and antimony oxides forms the well-known Naples yellow, which, however, is not permanent, being easily blackened by impure air. Gamboge is a natural organic pigment, as is also Indian yellow. Cadmium yellow is a sulphide of cadmium, and is therefore not permanent in mixtures that are affected by sulphur. It has an effect on emerald green, for example.

Blue pigments comprise a number of important colours, as indigo, Prussian blue, and ultramarine. Besides these, certain salts of cobalt find application as pigments under names of smalt, cobalt blue, azure blue, etc. Cobalt blue is a thoroughly trustworthy pigment and most useful. By artificial light it looks somewhat purplish.

Green compounds include chiefly compounds of copper and arsenic. The latter are highly poisonous; and, although bright and brilliant, their use in wall-papers, etc., is highly to be condemned. Of late years their use has largely decreased. The commonest are Scheele's green and Schweinfurth's green. Brunswick and Bremen green are copper compounds, as is also verigris. Cobalt green possesses good colour, and consists of compounds of cobalt and zinc. Sap-green is a natural organic green obtained from blackthorn berries, but possesses little body. Greens may also be obtained by proper admixture of yellow and blue pigments.

Red pigments comprise a number of important compounds. Amongst these are the lakes from madder, cochineal (forming crimson lake), and lac lake. Carmine is obtained from the cochineal insect. Cinnabars and vermilion are brilliant pigments, consisting of the sulphide of mercury, but are frequently adulterated with red lead or minium, itself a common red pigment. Vermilion is useful in oil- and water-colour, though somewhat liable to turn black. Chinese vermilion is the safest variety to use. Venetian red, rouge, Turkey red, and some others, are all oxides of iron, the first being mixed with some earthy matter, the two latter being pure oxides.

Brown pigments consist chiefly of ochres. Some browns are obtained from bituminous soils, while the commonly-used sepia consists of a secretion of the cuttle-fish. A large number of substances not named also enter into various pigments, while many also are especially prepared for certain purposes, and hence contain special ingredients, as *e.g.*, to prevent corrosion, decay, etc.

Pigmies, or PYGMIES, a loose general term for races of men that are far below the average height. It is now commonly restricted to certain dwarf races of Equatorial Africa, especially to the Akkas and Wambutti. But though the pigmies worried Sir Henry Stanley's expedition, they by no means emerged into history then for the first time. Homer, Herodotus and Pliny had heard of dwarfs inhabiting the marshes of the Upper Nile Valley. Ptolemy, the Alexandrian geographer, also alludes to them. Andrew Battell (1565-1640), during his captivity in Loango, met with the Matimbos, "no bigger than boyes of twelve yeares olde." Dapper,

the Dutch geographer of the 17th century, heard of them as "pigmies, indeed, in stature, but with heads of prodigious bigness." Modern African explorers, such as Dr. Krapf, the German missionary, J. H. Speke, Consul Petherick and his naturalist Dr. James Murie, Dr. Schweinfurth, Paul du Chaillu, met races of dwarfs in various parts of the "dark continent" (as it then was justly to be described) before Sir H. M. Stanley's day. It is still a moot point who these pigmy tribes are. Are they remnants of the aborigines that have gradually and in the course of ages sought the security of the dense equatorial forest of the Aruwimi, the Ihuru and



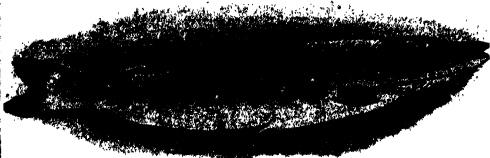
PIGMIES FROM AFRICA.

(Photo: W. & D. Downey, Lbury Street.)

Ituri rivers from the encroachments of more powerful intruding peoples? Or are they the outcasts of other tribes who have slowly sunk into their present degraded state? Though the question is still open, Dr. Robert Brown inclined to the opinion that the dwarfs are not a separate race but the pariahs of surrounding tribes.

Pike, a fish belonging to the Physostomous family Esocidae, with a single genus (*Esox*) containing five or six species, all valued for the table. The Common Pike (*E. lucius*) occurs not only in the United Kingdom, but is found also in other parts of Europe, Asia, and America, and to the last-named continent the other species (sometimes styled Pickerel) are restricted. The body is covered with scales; barbels and adipose fin are absent, and the dorsal fin is set just above the anal. The Pike or Jack is olive-grey above, with pale mottlings, and silvery-white beneath. It is said to attain a length of from five feet to six feet, but specimens of from two feet to four feet are much more common. It is extremely voracious; its ordinary food consists of frogs and young fish; but ducklings, goslings, young moorhen and water-rats are often devoured. From its extreme voracity it has been called the "fresh-water shark" or "wolf." It is long-lived; but the

story of the pike 250 years old is an invention or more probably founded on a mistake. It will be remembered that the arms of Sir Thomas Lucy (1532-1600), who threatened to prosecute Shake-



PIKE.

(*Esox lucius*.)

speare for stealing deer from Charlecote, and upon whom Shakespeare modelled his "Justice Shallow," were three "lucies" or pikes. At that period, according to Yarrell, the pike was so scarce in England that a large one was worth twice the price of a house-lamb in February and a small one sold for more than a fat capon. Still, since so many receipts exist for serving and carving pike for the table, even before the reign of Henry VIII., it seems clear that the fish must have been abundant in some counties.

Pilate, PONTIUS, the fifth Roman procurator, or governor, of Judaea, Samaria, and Idumaea. The procurator was chiefly responsible for the financial administration and especially the collection of the taxes within the area entrusted to his care. Officially he resided at Caesarea and had command of a considerable military force for the purpose of maintaining order. Of Pilate's origin nothing is known. A legend tells how he was born at Mayence, the natural son of a king, who sent him on account of a murder to Rome, whence, for another murder, he was exiled to Pontus, a province of Asia Minor on the Black Sea. It seems far-fetched even for a legend. He was appointed to office in A.D. 26 and governed for ten years, that is, throughout the period of the ministry of Jesus and the founding of Christianity in Judaea. However, in spite of his ruling for what was an unusual period, he had frequent collisions with the Jews whose obstinate adherence to creed and ceremony he either did not appreciate or despised. Nevertheless, he generally gave in to his subjects, partly through fear of the consequences of their turbulence, partly lest they might carry out their repeated threats of appeal to the Emperor Tiberius. His attitude in the trial of Jesus was at first inspired with a real desire to do justice, but his interest was not sufficiently personal and keen, nor was he morally strong enough to withstand the insensate fury of the members of the Sanhedrin and so, against his better judgment and conscience, he ultimately yielded to the priest-ridden mob. Pilate's career ended in his recall to answer certain complaints against his suppression with bloodshed of a harmless movement in Samaria. Tiberius died before he reached Rome, however, and thenceforward Pilate disappeared from history. He is said by Eusebius to have committed suicide

whilst living in exile at Vienne in Gaul, where a curious monument, 52 feet high, is still shown as Pilate's Tomb. According to another legend, his body was cast into the Tiber and caused so much commotion in the stream that it had to be removed, the same result taking place elsewhere; it was at last sunk in a deep and lonely pool on Mount Pilatus near Lucerne. According to a very ancient tradition, his wife—Claudia Procula or Procla—became a Christian. She was canonised by the Greek Church, her day being the 27th of October.

Pilatus, MOUNT, an Alpine peak in Switzerland, on the borders of the cantons of Lucerne and Unterwalden, near the town and lake of Lucerne. The highest point reaches 7,000 feet. The fine view obtainable from its summit has led to the construction of a pathway and railway. The name is probably derived from the Latin *pilatus*, "hatted," on account of the clouds which often clothe its summit, but became corrupted into Pilatus, from the association of the mountain with the legend concerning the disposal of the corpse of Pilate.

Pilchard (*Clupea pilchardus*), a very valuable food-fish of the same genus as the Herring, which it greatly resembles, though somewhat smaller and broader. It may, however, be distinguished by the radiating ridges on the gill-cover. It is abundant in the English Channel, on the coast of Portugal, and in the Mediterranean. The average length of those taken off the coasts of Devon and Cornwall is about ten inches; the French Pilchards or sardines are much smaller, owing to the fact that the young fishes are taken and tinned for the market. Pilchards are also put up in oil in the same way in Cornwall, and there is a factory at Deal where sprats are tinned. The pilchard fishery is of great importance commercially. It begins in August, and is carried on till the April following. The coming of the fish is the greatest event in the Cornish fishermen's year. When the huer, or outlook-man, stationed on a cliff or at the masthead of a boat gives the signal of the course taken by the pilchard shoals, the most animated scenes in English waters are witnessed. When chased by the dog-fish or tunny the pilchard darts through the water with such velocity as to cause flashes of light. The fishes, which are not required for home markets are salted in vats, pressed, and packed in hogsheds for exportation. A hogshed weighs nearly 500 lbs., and contains from 2,500 to 3,000 fishes; and some 15,000 hogsheds are annually sent to the Mediterranean ports. The pilchards feed upon small crustaceans and other minute marine organisms. The spawn is quite transparent, and is shed on the surface of the water, where it floats till the eggs are developed.

Pilcomayo, a river of South America, rising in the high lands between Potosi and Lake Poopo, Bolivia. It pursues a direction mainly south-eastwards and, after receiving on the right hand the Pilaya, its chief tributary, crosses the vast expanse of the Gran Chaco, ultimately falling into the Paraguay near Asuncion. During the latter part of its run it serves as the boundary between

Paraguay and the Argentine Republic. Its course has been variously estimated at from 1,000 to 1,700 miles. About 100 miles from the mouth it divides into two branches, one of these again dividing into two. The rapid current in parts, and shallowness in the dry season, render navigation well-nigh impossible.

Piles, or **HÆMORRHOIDS**, tumours formed by the dilatation of the veins or by thickening of the folds of skin or mucous membrane in the neighbourhood of the anus. Piles are of two varieties, external and internal, the latter being situated within, and the former outside, the sphincter muscle. In the case of internal piles one of the most characteristic symptoms is bleeding. Piles are caused by obstruction to the return of blood through the veins of the lower bowel, one of the most important predisposing causes being habitual constipation. Treatment consists in the regulation of the action of the bowels and in the local application of some astringent preparation such as the compound gall ointment, or wych-hazel ointment, which in many cases is a specific, acting like magic. In some instances operative treatment is necessary to remedy the condition, but it is a radical cure, unattended with danger.

Pilgrim (Latin, *peregrinus*, Italian, *pellegrino*, "a foreigner," "a traveller"), one who travels to a sacred spot, either by way of self-imposed penance for sin or in fulfilment of a vow or religious obligation with a view to deriving spiritual consolation or miraculous benefit. The custom of going on pilgrimage is ancient and characterises all faiths, the Brahmin and Mohammedan as well as the Christian. Apart from Jerusalem and the Holy Land, among the most favoured resorts of pilgrims are Mecca in Arabia, Puri or Juggernaut in Bengal, Rome in Italy, Santiago de Compostela in Spain, St. Denis and Lourdes in France, Einsiedeln in Switzerland, Canterbury and Glastonbury in England, and Iona and Melrose in Scotland. The pilgrim bore the irreducible minimum of baggage. He carried a long staff to rest him on his weary way, a round ring-necked bottle tied round his body to hold water, a scrip or wallet to contain food, and a cockle- or scallop-shell in his broad low-crowned hat, the shell being, however, not usually adopted until the pilgrimage was accomplished. In course of time the practice was grossly abused and there is no reason to doubt but that Geoffrey Chaucer's *Canterbury Tales* gave a faithful picture of the manners and customs of the 14th-century pilgrims. Not unnaturally the religious usage was copied in other spheres of human activity and thought, and pilgrimages became an outward and visible sign of hero-worship. Thus every year visitors crowd to such "shrines" as Shakespeare's birthplace in Stratford-on-Avon, or Burns's birthplace at Alloway, or Sir Walter Scott's mansion at Abbotsford.

Pilgrim Fathers, the name applied to that body of English, Scottish and Dutch emigrants who, in 1620, embarked for conscience' sake on the *Mayflower*, at Delfshaven (now a suburb of

Rotterdam) in Holland, called in at Plymouth in England and landed at Plymouth in Massachusetts. They were the pioneer colonists of New England and the progenitors of the founders of the United States. "The Men of the *Mayflower*" was perhaps the finest and most dramatic of the lectures of William Morley Punshon (1824-81).

Pilgrimage of Grace, the name given to the great armed rising of 1536 directed against "the villain blood" in the council of Henry VIII., Thomas Cromwell, whom the insurgents denounced as a heretic and the nobles regarded as a low-born upstart. After the ruthless spoliation and suppression of the monasteries, some of the nobles having been thereby bribed into acquiescence, the report spread that the commissioners charged with the suppression of the minor monasteries were about to seize the church jewels and plate, that the churches were to be destroyed and new taxes levied. Sir Thomas More, the foremost Englishman of his time, and Bishop Fisher, had been beheaded and religious and agrarian discontent was deep and widespread. On Sunday, October 1st, 1536, after vespers, the people of Louth, in Lincolnshire, headed by Nicholas Melton, a shoemaker, and therefore nick-named Captain Cobbler, rose, knowing that on the day following the clerical commission was coming. By October 4th the whole of the country was in revolt. Priests marched before the ranks in their habits. Banners bearing the emblems of the five wounds of Christ were carried. All took oath that they entered on the pilgrimage from no other motive than the love of God. By the 6th thirty thousand rebels assembled in Lincoln, but on the 11th, when the Duke of Suffolk entered the city, the agitation was already dwindling for lack of food, those who remained disbanding on the promise of pardon. But the movement had spread into Yorkshire and being better led by Robert Aske, a lawyer, assumed more serious proportions. Forty thousand men were encamped in and near to York by October 16th. Farmers headed by their parish priests marched into the city. The Archbishop of York, the Percies and Lord Darcy, an old soldier and chief of the Yorkshire nobles, joined them. Cromwell ignored the threatened dangers. Only the confidence of the insurgents in the righteousness of their cause and their belief in the royal justice saved England from civil war. The Duke of Norfolk agreed to the terms they made. The banners of the "five wounds" were cast aside with the cry, "We will wear no badge but that of our Lord the King," and the insurgents dispersed, as they thought, triumphant. A few isolated outbreaks, however, were seized upon as a pretext for the withdrawal of the promised concessions and then in the early part of 1537 a new rebellion broke out. The country was now given over to military executions and the leaders were arrested. Lords Darcy and Hussey were beheaded. Sir Robert Constable, Aske, the heir of the Percies, and abbots and gentlemen were hanged. Lady Bulmer was burnt at the stake. Before Cromwell fell from the King's favour, after eight years of supreme authority, he had not only accumulated high offices but the revenues of four

great monasteries had been made over to him. Amid popular acclamations he was charged with heresy, oppression and extortion, and was beheaded on July 28th, 1540.

Pilidium, a larval stage in the worms belonging to the class of Nemerteans. It has a rounded, somewhat bell-shaped body, inside which the new worm develops around the alimentary canal of the embryo.

Pillar. A pier, pillar, or column, signifies the detached support on which the arches of a building rest. The Saxon word pier is usually applied to the solid parts of a wall between doors and windows and to masses of masonry standing alone to support gates or arches. The column is always round, it may be twisted and spiral, and the word is specially used with reference to classic architecture. Great memorials occasionally take the form of a column standing alone, as Pompey's pillar, at Alexandria in Egypt, one of the most noted monuments of antiquity, although it had nothing to do with Pompey, having been erected in honour of Diocletian; the Nelson column in London; and the Trajan column in Rome, on which were carved 2,500 figures besides animals, sculptured on a spiral band representing incidents in the war with the Dacians. It stood in a court with galleries around from which to view the groups. Pillars are the most characteristic feature of the various orders of architecture. In the Norman period they are generally massive, built up of small stones, often circular, with capitals of the same form, or square. As the arched roof developed the plain surface of the pillar was broken up and small separate columns were introduced to support each part of the vaulting. In the Early Pointed style the pillar becomes loftier and lighter, and a favourite arrangement was to group four small shafts round a large central pillar to which they were frequently banded at different heights. In Decorated work the clustered pillars change from a circular to a lozenge-shaped arrangement. In the Perpendicular period a plain octagonal pillar was introduced, its sides being frequently slightly hollowed. Sometimes the whole of the mouldings are continuous without capital or impost moulding. They are usually arranged as a square placed diagonally. Sir Christopher Wren uses the word pillar in describing Roman and Gothic buildings, but he does not apply it, he tells us, to the "marble shafts" at Salisbury, "because they are so small and slender."

Pillar-Saint, a solitary ascetic who passed the greater part of his life on the top of a lofty pillar or column without shelter. This method of mortification was mainly practised by Eastern monks, especially in Syria, from the 5th to the 11th century. St. Simeon Stylites was the most remarkable victim this form of monomania.

Pill-millepedes, a group of small millepedes (or Diplopoda) forming the family Glomeridae, and characterised by their habit of rolling up into a ball like the common wood-louse (*Oniscus*).

Pillory, a mode of punishment now obsolete. It consisted of a raised scaffold upon which was a

cross formed of planks. At the junction of the arms and upright of the cross was a hole, almost horizontal with a hole in each of the arms, and in these holes the neck and wrists of the culprit were secured, and he was subjected to the abuse and maltreatment of the populace. There were other kinds of pillory, but this was the usual design. Besides standing in the pillory the unfortunate person might also be sentenced to lose his ears,



PRYNNE IN THE PILLORY.

thus increasing the dread of derision immeasurably. When the victim was the object of tyranny and injustice, however, the onlookers expressed their sympathy in a variety of ways. Among such popular favourites were William Prynne and Daniel Defoe. The punishment was abolished, except in cases of perjury, in 1816, and entirely abolished in 1837. Titus Oates was put into the pillory for perjury, and its use in the colony of New England is mentioned by Nathaniel Hawthorne in his *Scarlet Letter*.

Pills are small masses containing various active substances mixed with treacle, liquorice, soap, confection of roses, and the like. Drugs are usually administered in pill form when they are designed to act slowly or to remain inoperative until the pill reaches the intestines. Their convenience has always rendered pills a universal if not a favourite form of taking medicine.

Pilot. Before charts existed vessels were navigated by the use of a sounding lead, the pilot's office being derived, according to Wedgwood, from the German *peilen*, to sound. A pilot is qualified and licensed to conduct vessels into and out of harbour and in dangerous channels. His fees are determined partly by distance and upon the ship's draught of water. Pilots are appointed and controlled by numerous societies or corporations in the districts into which the United Kingdom is divided for purposes of jurisdiction, the London Trinity House having a leading position, and all these are subject to the Board of Trade as the supreme mercantile marine authority. On appointment a pilot receives his licence, which must be delivered up if required and returned at his death. In certain British waters it is compulsory to employ a pilot and while in "pilot-water" the pilot is master of the ship, but may be superseded for manifest incapacity or in case of intoxication. If he endanger the ship he will be liable to suspension. On British warships the navigating officer is pilot under the captain, and if a pilot is taken the captain and his navigating officer remain responsible. The pilot's flag is large with two horizontal red and white stripes, and his boat is also licensed by the district authority, and her number, owner's name, and her port must be conspicuously painted thereon.

Pilot-fish (*Naukrates ductor*), a small fish, allied to the Horse Mackerel, common in tropical and temperate seas. In form it is not unlike a mackerel; its colour is generally bluish-grey, with five dark-blue vertical bands. It constantly follows ships and large fishes, especially sharks. The precise nature of the connection between the Pilot-fish and the Shark is unknown; but Günther



PILOT-FISH.
(*Naukrates ductor*.)

endorses Meyen's opinion that the former feeds on the excrements of the latter, and says that it also picks off the parasitic crustaceans with which the shark, like all large fishes, is infested.

Piloty, KARL VON, painter, was born at Munich, Bavaria, on October 1st, 1826. He studied at Munich Academy and also in the art schools of France, Belgium and England. His first great work in history—the branch which he specially affected and of which he was a leading exponent—was "The Elector Maximilian joining the Catholic League," which was soon followed by "Sani beside the Body

of Wallenstein." In 1856 he was appointed Professor of Painting at Munich Academy and in 1874 he succeeded Wilhelm von Kaulbach as Director. The duties of these posts did not interrupt his studio work and among his more famous pictures were "The Assassination of Wallenstein" (1858), "Nero amid the Ruins of Rome" (1860), "Galileo in the Dungeon" (1861), "The Death of Julius Caesar" (1865), "Columbus Discovering America" (1866), "Mary Queen of Scots listening to her Death-Warrant" (1869) and "Thusnelda in the Triumph of Germanicus" (1873). His pupils included artists many afterwards celebrated, such as Lenbach, Defregger, Makart, Gabriel Max and Hermann Kaulbach. He died in Munich on July 21st, 1886.

Pilsen, a town of Bohemia, at the confluence of the Mies and Radbusa, 53 miles S.W. of Prague. It is a well-built city, consisting of the town proper and suburbs. St. Bartholomew's is a fine 13th-century Gothic church, with a spire 337 feet high. Other buildings of note are the Renaissance Town Hall, in the banqueting-room of which Wallenstein received the oath of fidelity from his generals, the technical school, the training college, and the historical and industrial museum. Brewing is the outstanding industry, an enormous area being occupied with the breweries and miles of cellars. Pilsener beer is in repute and request in other lands than Bohemia. The manufactures include machinery, bell-founding, wire-drawing, copper-founding, glass, porcelain, pottery, paper, leather, vehicles, liqueurs, and spirits. Coal, iron, alum and kaolin are worked in the vicinity. The first printing-press in Bohemia was set up at Pilsen in 1468. Pop. (1900), 68,290.

Pimas, North American aborigines, partly in Arizona, United States, but chiefly in the conterminous Mexican states of Sonora and Sinaloa. They speak numerous dialects of a stock language, which, however, has been affiliated by Buschmann, on insufficient evidence, to the Aztec family. In Arizona the chief are Pima Alta, Gila River, for 200 years allies of the Coco Maricopas; Papago, widespread in South Arizona and Mexico; Sobai-puri, Santa Cruz, and San Pedro, affluents of the Gila, apparently extinct. The chief divisions in Mexico are Papago, Pima Baja, Opata, Cora, Cahita, Tarahumara, and Tepeguana. Those in the United States, collectively numbering nearly 10,000, are mostly confined to the Pima Agency, 65,000 acres on both sides of the Gila River, Arizona. Those of Mexico, sometimes called Pueblo Indians because occupying fixed *pueblo* or village settlements, are estimated at from 70,000 to 80,000, though the figures appear to be altogether too high. But in the Pima family have been included many tribes that really belong to the Yuma and other connections.

Pimento. [ALLSPICE.]

Pimpernel (from the Celtic *pimper*, "five"), the popular name for several little creeping plants, with five-pointed corollas, especially *Anagallis arvensis*, the scarlet pimpernel, *A. cerulea*, the blue, *A. tenella*, the bog, and *Lysimachia nemorum*, the

yellow or wood pimpernel, all members of the primrose family. The genus *Anagallis* has capsular fruits which, with those of a few other plants, split transversely when ripe. *A. arvensis* is a weed in cultivated ground. Its petals close in wet, cloudy, or threatening weather; hence the plant is known popularly as the "poor man's [or "shepherd's"] weather glass," and also as "John-go-to-bed-at-noon." *A. tenella*, with pale pink funnel-shaped flowers, grows in peaty bogs.

Pimples. [PAPULES.]

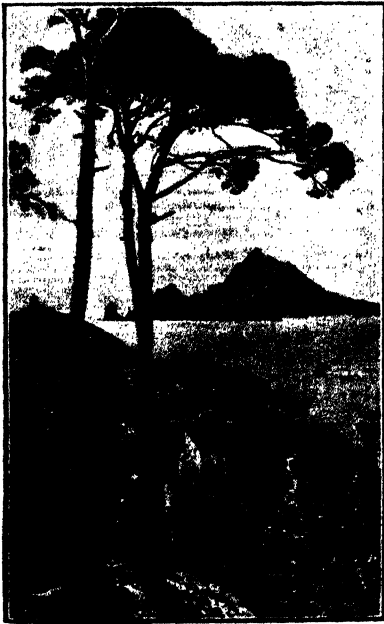
Pinchbeck, an alloy of copper and zinc, containing more copper than ordinary brass. The proportion is usually about three parts of copper to one part of zinc. It possesses a reddish-yellow colour, is malleable, and can be worked with comparative ease. It was named after its inventor, Christopher Pinchbeck (1670-1732) of Clerkenwell, who made watches and astronomical clocks and was a mechanic of no mean order. Pinchbeck metal being frequently used to imitate gold, the word came to be used figuratively for "spurious," as "pinchbeck patriotism," "pinchbeck heroism."

Pinckney, CHARLES COTTEWORTH, statesman, was born at Charleston, South Carolina, United States, on February 25th, 1746, and was educated at Christ Church, Oxford, the Middle Temple, London, and the Royal Military Academy of France. On his return to Charleston he practised as a lawyer, but after the outbreak of the War of Independence he fought at Brandywine and Germantown, and was taken prisoner at Charleston. He assisted in framing the United States constitution, was a member of the Convention which passed it, but declined a seat in Washington's cabinet. Sent as United States Minister to France in 1796, the Directory, offended at the then attitude of his country, dismissed him and threatened war. The United States reinstated him and associated John Marshall and Elbridge Gerry with him in the representation. At last Talleyrand declared that peace could not be made until the Directory were recompensed. Pinckney scorned the suggestion. "War be it, then!" he exclaimed. "Millions for defence, but not a cent for tribute." When the envoys reached the United States, Pinckney's spirited protest became the motto of the day. He was elected to Congress, but when he was run for the Vice-Presidency in 1800 and the Presidency in 1804 he received scanty support. He gradually retired from public life and died in Charleston on August 16th, 1825.

Pindar, the greatest lyric poet of Greece, was born at Cynoscephale near Thebes in Boeotia about 522 B.C. He was descended from a musical family, and studied flute-playing under Lasus of Hermione at Athens. In his youth he derived much benefit from the advice of his townswoman, the poetess Corinna, who several times defeated him in public contests. He resided at the courts of Hiero of Syracuse and Theron of Acragas, yet so far was he from sacrificing his independence that he introduced friendly advice into the verses composed for these princes. His affectionate regard for the city of

Athens was rewarded with the proxenia, an office the duties of which consisted in entertaining and assisting the Athenians who visited Thebes. He is said to have died at Argos in 443 B.C. Pindar's poems, which cover a period of fifty years (502-452), include Hymns to the gods and Encomia in praise of men, Dithyrambs, Pæans, Prosodia (processional songs), Parthenia (choral songs for maidens), Skolia (festal songs), and Threnoi (dirges). Besides beautiful fragments representing each of these types, we possess in their entirety four books of Epinikia, odes of victory celebrating the successes achieved at the great national games—Olympian, Pythian, Nemean, and Isthmian. In these compositions the praises of the hero are blended with mythical narratives and moral reflections, the whole being wrought together into a strain of the loftiest and most glowing enthusiasm. The language is epic, with a Doric element. It is now known that the extraordinary variety in the metre was not due to the poet's caprice, but was strictly conditioned by the requirements of the musical accompaniment. [ODE.]

Pine, a name now restricted by botanists to the genus *Pinus*, which includes about seventy species of cone-bearing trees, natives of the northern hemisphere, and mostly extra-tropical. Growing socially, they form extensive forests in the north of Europe, America, and the Himalaya, often exclusively of a single species. One, the Northern



PINE.
(*Pinus Pinæa*.)

Pine or Scots Fir (*P. sylvestris*), is the only indigenous species in the British Isles. The distinctive

characters of the genus are that its prismatic needle-like evergreen leaves are borne on dwarf shoots, two, three, or five together, in the axil of a membranous scale-leaf, and that the cone persists,



PINE-APPLES GROWING.
(Photo: R. W. Concy, Durban.)

the apex of its scales becoming a thick woody rhomboid apophysis with a central point. The leaves vary from an inch to a foot in length, and sometimes remain several years on the tree. The flowers are monoecious, the male consisting of numerous imbricated sporophylls (stamens) each bearing two pollen-sacs, and the female of a cone, each scale of which bears two ovules. The pollen-grains have bladder-like expansions of the extine, and the seeds, which are sometimes large and edible nuts, generally have a thin wing. The timber, tar, and turpentine of the various species are highly important in the arts and in commerce, the tree being, economically, one of the most valuable in the world. The Northern Pine occurs in Siberia and over most of Europe. It yields Red, Norway, Riga, or Baltic Pine. In Scotland it is the badge of the Clan M'Gregor. *P. Pinaster*, the Cluster or Maritime Pine of southern Europe, binds together with its roots the shifting sands of the Landes, and yields Bordeaux turpentine; *P. Pinæa*, the Stone Pine of southern Europe, is the chief species with edible nuts and a particular favourite with landscape painters from J. M. W. Turner downwards; *P. rigida* and *P. australis*, the Pitch Pine of northern and southern United States respectively, and *Pseudotsuga Douglasii*, the Oregon or Douglas Pine, ranging from British Columbia to Mexico but at its best in Oregon and Washington, are the chief timber-providers.

Pine-apple (*Ananas sativa*), a biennial plant belonging to the Bromeliaceæ, with rigid, spinous, aloe-like leaves, and a remarkable infructescence, all

the scaly perianth-leaves and the fruits of a flowering branch becoming imbedded in the exterior of the fleshy mass of the branch. This branch terminates in a crown of leaves, and externally resembles in its rhomboid withered flowers the cone or "apple" of the pine, whence its name. Though fibrous, this branch becomes one of the sweetest and most delicately and most distinctively flavoured of dessert "fruits." Though a native of South America the plant has been naturalised throughout the tropics and is extensively cultivated. Made known to Europeans in Peru about the middle of the 16th century, the first to reach England came as a present to Oliver Cromwell. The pine-apple may have been grown in England as early as the reign of Charles II.; and, though expensive to cultivate, owing to the heat necessary, English-grown specimens surpass those of the tropics both in size and flavour. Great quantities are imported into the United Kingdom from the Azores and Bahamas, both fresh and preserved in syrup.

Pinero, ARTHUR WING, dramatist, was born in London on May 24th, 1855. He was educated privately and began his professional career as an actor and for several years appeared in the leading English companies. In July, 1881, he withdrew from the stage to devote himself wholly to dramatic authorship. Though his complete knowledge of stagecraft gave him an unusual advantage, he speedily showed himself a consummate master of characterisation and plot, and in due course took the position of the foremost dramatist of his time. Among his earlier plays were *The Magistrate*, *Dandy Dick*, *The Squire*, *Sweet Lavender*, *The Profligate*, *The Cabinet Minister*, *The Times*, *Lady Bountiful*, and *The Amazons*. These were all successful and some of them held the stage. They were followed by a number of works in which a much more serious note was struck, among them *The Second Mrs. Tanqueray* (1893), *The Notorious Mrs. Ebbanith* (1895), *The Gay Lord Quer* (1899), *Letty* (1903), *A Wife without a Smile* (1904), and *His House in Order* (1906).

Pinerolo, or PIGNEROL, a town of the province of Turin, Piedmont, Italy, on the Clusone, 21 miles S.W. of Turin. The principal buildings are the cathedral of St. Donatus, the episcopal palace, hospital, public library, and Waldensian chapel. The industries include woollens, cottons, silk, hemp, paper and leather. In 1246 the suzerainty of the house of Savoy was recognised by the townsfolk. Francis I. of France obtained possession of it in 1536, but in 1574 it was restored to Savoy. Under Cardinal Richelieu a second French occupation came to pass in 1630, and strenuous efforts were made to Gallicise the people and institutions. The fortifications were enlarged and strengthened, and the citadel was also used as a state prison, its most famous occupant being the Man with the Iron Mask. Before the retirement of the French in 1696 the town was largely dismantled. Pop. (1901), 18,250.

Pink, the garden name of several species of *Dianthus*, a large genus of Caryophyllaceæ. They

are mostly natives of the temperate regions of the Old World, and are distinguished by having two or more bracts at the base of a cylindric calyx-tube, and two styles. The ovary, though with "free central" placentation, exhibits rudiments of septa between its constituent carpels. Their foliage is generally linear and often glaucous; their flowers are white or some shade of pink or red, often dotted or lined with white, or with a ring of another shade, and with fringed margins to the petals. The pink, carnation and picotee differ so little botanically that they are all regarded as varieties of the Clove Pink; but as florists' flowers they are decidedly distinct from each other.

Pinkerton, JOHN, antiquary and historian, was born in Edinburgh on February 17th, 1758, and was educated at Lanark Grammar School and privately. After his father's death he removed to London in 1781, and turned his attention to literature. His earliest efforts were in verse and showed no promise. In 1784 he published an *Essay on Medals* of some value, and in 1785 *Letters of Literature*, in which he depreciated the Greek and Latin classics, and advised a new method of orthography. In 1786 appeared his collection of *Ancient Scottish Poems*, and in the following year his *Dissertation on the Origin and Progress of the Scythians or Goths*, intended to prove that the Celts were an inferior race, the aborigines of Europe. Continued research culminated (1797) in what he deemed the "greatest labour of his life," namely, *The History of Scotland from the Accession of the House of Stuart to that of Mary*. He devoted his later years to very miscellaneous work, including *Modern Geography* (1802) and a collection of voyages and travels (1807-14), and died in Paris on March 10th, 1826.

Pink Eye, a term applied to a disease which affects horses. It is a kind of contagious influenza, prevalent during cold, wet weather. It is febrile in character, and described as analogous to scarlet fever in the human subject. Its name is derived from the pink colour assumed by the conjunctiva. The disease runs its course, favourably as a rule, in from five to ten days, leaving the animal very weak. As loss of appetite is one of the earliest of the symptoms, care should be taken not to work horses which exhibit any disinclination to feed. The disease should be allowed to run its course, keeping the horse free from risk of cold and other complaints.

Pinkie, an estate at the east end of the town of Musselburgh, 7 miles from Edinburgh. It is famous as the site of the last battle between England and Scotland as independent kingdoms. This was fought on September 10th, 1547. The Scots were completely defeated—their loss in one account being given at 10,000—by the English under the Protector Somerset. Pinkie House, with somewhat of the appearance of a château, was originally a country-seat of the abbots of Dunfermline, and passed to Alexander Seton, first Earl of Dunfermline. It contains a magnificent Painted Gallery, and was occupied by Prince Charlie on the night after the battle of Prestonpans in 1745.

Pinna, or the PEARL MUSSEL, one of the genera of mollusca belonging to the class Lamelli-branchiata, from which pearls are derived. The pearls are formed by a secretion from the mantle over sand grains or other bodies which get between the mantle and the shell and thus irritate the animal. The shells are sometimes two feet in length and are attached by a beard or byssus, the fibres of which have been woven. Pinna nobilis excels the others of the genus in the quantity and fineness of its silken byssus, of which articles of dress have been made. In early times these garments were worn only by emperors and kings. At Taranto, in Italy, this byssus silk is still mixed with about one-third of real silk, and made into gloves, caps, stockings and the like of a beautiful brown colour. These articles are purchased as curiosities, but are too costly for use, a pair of gloves selling in the town of their manufacture for six shillings, and a pair of stockings for eleven shillings. The shells of the fossil genus Trichites found in the English Oolite are sometimes over a yard in length.

Pinnate (from the Latin *pinna*, "a feather"), a term applied to compound leaves when the leaflets (*pinnae*) are arranged along the sides of a mid-rib or rachis. If there is an odd leaflet terminating the rachis, as in the rose or the elder, the leaf is imparipinnate or unequally pinnate; if not, as in Acacia, it is paripinnate, equally or abruptly pinnate. If the pairs of leaflets (*juga*) are alternately large and small, as in the potato, the leaf is interruptedly pinnate, as is also the leaf of Agri-monia, which, having a larger terminal leaflet, is also termed lyrate-pinnate. When some or all of the divisions of a pinnate leaf, still termed *pinnae*, are themselves pinnate, so that the primary rachis bears secondary rachides, the leaf is bipinnate; or if again divided, as in many ferns, tri-pinnate. The ultimate leaflets are called pinnules. A simple leaf lobed in a similar manner may be pinnatifid, pinnatifid, or pinnatisect, according to the depth of the lobings.

Pins are one of the most useful and necessary adjuncts of dress, and as such have been in use from time immemorial and in very early stages of civilisation—thorns, fish-bones, and metal having all been pressed into the service. The common pin, as now known, generally consists of brass tinned, and undergoes numerous processes before being fit for its intended purpose. Steel is also employed for larger fastenings, such as baby's clothes, when what is known as the safety-pin is used, and especially for securing the hair and woman's head-gear, the hat-pin in these cases bearing some resemblance to a stiletto-like weapon.

Pisanti, CRO, composer, was born at Sinalunga, in the province of Siena, Italy, on May 9th, 1829. He was taught by his father, and played in public at the age of ten. He came to England, still a boy, and studied the piano and composition under Cipriani Potter and the violin under Henry Blagrove. Returning to Italy, he took his degree (1847) at Bologna, where he came under the personal influence of Rossini. Next year he settled in England

as a teacher of singing, and in 1856 was appointed Professor of Singing at the Royal Academy of Music. In 1859 he wrote the *Te Deum* for the annexation of Tuscany to Italy, in 1873 brought out his opera of *Il Mercante di Venezia* at Bologna and, in 1877, another opera, *Mattia Corianno*, at Milan. In 1878 King Humbert created him knight of the Italian crown. He died at Florence on March 10th, 1888. He is most widely known by his numerous songs, part-songs, and choruses—melodious, spirited and frequently scholarly. Sustained work was not his *métier*.

Pint, a measure of capacity equal to half a quart. The imperial pint is equivalent to the eighth part of a gallon, 34.65925 cubic inches. The Scots pint was replaced by the imperial, of which it held at least three. There was also a local unit of weight called a pint, which was used for butter and was equal to one pound and a quarter. The word "pint" comes from the Spanish *pinta*, Latin *pieta*, seemingly because it was a part marked or painted on a larger vessel.

Pintail, a duck belonging to the genus *Dafila*, which occurs in the northern countries of the Old and the New Worlds. The tail is long and pointed.

Pinto, FERNÃO MENDES, an adventurer, was born at Montemor-o-Velho, near Coimbra, Portugal, in 1509 or 1510. After spending his early manhood in his native country he sailed to the East, where he passed through an extraordinary career, in the course of which he was shipwrecked several times, captured frequently and often sold into slavery. His *Peregrinação* is a record of his marvellous adventures in Arabia, Persia, the Indies, China and Japan, extending over a period of 21 years (1537-58). In spite of much exaggeration, the general veracity of the work is now acknowledged. When he returned to Portugal he spent some years about Court, but found life stale, flat and unprofitable after his experiences in the Orient. He died near Lisbon on July 18th, 1583.

Pinturicchio, whose real name was BERNARDINO DI BETTI, painter, was born at Perugia, Italy, in 1454. He began his career as an assistant to Perugino, but the first works he did independently (1484-92) were the decorations for the altars and walls of the series of chapels in the church of Santa Maria del Popolo in Rome, executed to the commission of the Della Rovere family. Of these the "Madonna Enthroned" and the "Assumption of the Virgin" were two noble conceptions. In 1492 he was engaged at Orvieto upon canvases for the cathedral. In the following year he was summoned to Rome again to decorate the Borgia rooms in the Vatican, which Pope Alexander VI. had just built and which now form part of the Library. This task occupied him till 1498, though he found time to execute some remarkable frescoes in the Bufalini chapel in the church of Santa Maria in Ara Coeli. In 1501 he painted some fine frescoes in Santa Maria Maggiore at Spello, but among his most brilliant and best preserved frescoes are those which he did for the library of Siena Cathedral in 1502 and later years. In 1508 he was once more busy at

Spello and in the very year of his death—which took place at Siena on December 11th, 1513—he completed one of his most beautiful panel pictures, that of “Christ bearing His Cross,” now in the Palazzo Borromeo in Milan. His largest panel, representing the “Coronation of the Virgin,” in which he put forth all his skill and sympathy on the figure of Mary, is in the picture gallery at the Vatican.

Pioneer, one of a party or company of infantry that marches before the main body of a force in order to clear the way of obstacles, make good roads, dig entrenchments, and otherwise see that the road is clear. They are equipped with the tools likely to be necessary in carrying out work of this description. In peace time they are commonly engaged as handy men in painting and repairing barracks, etc. Hence the word pioneer is used figuratively for one who prepares the way for others in various fields of human effort. In this sense it is frequently employed in the history of exploration, science and industry. The duties of cavalry pioneers are likely to be destructive rather than constructive. In the enemy's country they have to destroy bridges, railways, telegraphs and so on.

Piotrkow, a province in the west of Russian Poland, covering an area of 4,729 square miles. The surface is broken by hills, some reaching a height of 1,600 feet, and ravines, and the chief rivers are the Warta and Pilica. The people are mostly engaged in cultivating the soil, the principal crops being rye, oats, wheat and potatoes. Cattle-raising is also an important pursuit, the breeding of horses being a speciality. Coal and iron are the leading minerals, and the industries include textiles, dyeing, jute, furniture-making, iron-founding, the making of agricultural implements, tanning and milling. Pop. (estimated), 1,460,000. The capital, Piotrkow, 90 miles S.W. of Warsaw, was a flourishing town in the 15th and 16th centuries under the Jagellon dynasty. Its castle was built by Casimir the Great. Pop. (estimated), 34,000.

Piozzi, **HESTER LYNCH**, the friend of Dr. Johnson, was born at Bodvel, near Pwllheli, Carnarvonshire, Wales, on January 16th, 1741. Her father, John Salusbury, was sent out to Nova Scotia for the Board of Trade while she was a child, but she received a liberal education and was a lively girl and daring horsewoman. On October 11th, 1763, she married Henry Thrale, a rich brewer of Southwark. Their house at Streatham speedily became a resort of the literary notabilities of the time, although Thrale was quite incapable of appreciating his wife's talents. Dr. Johnson became acquainted with Mrs. Thrale through Arthur Murphy in 1764, and for twenty years she remained his closest and most sympathetic friend. He travelled in Wales with the Thrales in 1774, and in France in 1775. Thrale died in 1781, and three years later, much to Johnson's indignation, Mrs. Thrale married an Italian musician named Gabriel Piozzi. In 1809 she again became a widow. When she was nearly eighty she grew sentimentally attached

to a handsome young actor named William Augustus Conway, and even contemplated marrying him. From 1814 onwards she lived chiefly at Bath, Clifton, and Penzance, and died at Clifton on May 2nd, 1821. Of Mrs. Piozzi's numerous works the *Anecdotes of the late Samuel Johnson* (1786) and *Letters to and from the late Samuel Johnson, LL.D.* (1788), alone survive.

Pipe, a liquid measure, employed chiefly in the wine trade, and varying with the wine for which it is used—e.g., a pipe of port generally contains 138 gallons, of sherry 130 gallons, of Madeira 110 gallons, of Lisbon 140 gallons—though ordinarily containing 105 imperial gallons or 126 wine gallons. It is also called a butt, and is equal to two hogheads, while two pipes make a tun.

Pipe, a tube used for the passage of gases, liquids, etc., and made of all kinds of material. Pipes of lead or clay and other plastic material are made by passing the clay or molten lead through a cylinder the interior of which is occupied by a solid mandril. The old method of making iron piping was to bend a plate of the metal and solder the edges together; but the process now generally followed is to cast a cylinder of iron around a steel mandril with a projecting point with conical end. This mandril end is passed through a hole in a steel post, and is grasped by machinery which draws the cylinder through the hole, thus spreading the metal equally on the outside while the mandril preserves the internal diameter. Tobacco-pipes are generally made in two pieces: a rolled cylinder through which wire is thrust, and a lump of clay which is welded to the stem and shaped outwardly by a mould, the interior of the bowl being shaped by the introduction of an oiled stopper. Care having been taken that the hole through the stem penetrates to the bowl, the stem is bent (if necessary) to the required curve, the pipe is trimmed and finished off, and then baked, eight or nine hours sufficing to turn out 50 gross of pipes. Tobacco-pipes vary in material from the homely corn-cob of the southern States of the American Union, which were alleged to have been introduced to favour by Mark Twain, to the highly-finished meerschaum for which Vienna is chiefly renowned, or the bejewelled hookah and narghile of the East. A kind of cherry-wood grown near Vienna and the mock-orange of Hungary are in great request for pipe-stems; while the briar-root pipe (made from the root of a leath, *bruyère*) is universally known, as are the scented pipes made of the myall-wood.

Pipe-clay, a fairly pure white clay, free from iron and alkalis, so that it does not fuse into a glass. It, however, contracts so in baking as to be useless for pottery. It occurs in the Middle Eocene or Bournemouth Beds of Alum Bay, Studland, Corfe, and Bovey Tracey (Devon), and often contains numerous well-preserved fossil leaves. It seems to have been formed from the decomposition of some felspathic rock, and to have been deposited in old lake-basins. It is used in making tobacco-pipes and in cleaning military accoutrements.

Pipe-fish, a popular name for any fish of that group of the family Syngnathidae in which the tail generally has a caudal fin, but is not prehensile as it is in the Sea-horses. The jaws are tubular, and the body is greatly elongated. The males usually carry the eggs till they are hatched in a pouch or glued to the abdomen. The great Pipe-fish (*Syngnathus acus*) is common on both sides of the Atlantic, and far from rare in rock-pools on the British coasts. Three species of the allied genus *Nerophis* are



GREAT PIPE-FISH.
(*Syngnathus acus*.)

also British. The name is sometimes given from its shape to the Tobacco-pipe fish (*Fistularia tabaccaria*), which, however, belongs to a different order.

Pipe-Rolls. [RECORDS.]

Piping-crow, a bird belonging to the Australian genus *Gymnorhina*, of the Crow family, with several species, one of which is often domesticated and mimics the human voice.

Pipit, a bird belonging to the genus *Anthus* of the Motacillidae, or Wagtail family. Like the larks, which they resemble in appearance, these birds seek their food on the ground, have large feet in proportion to their size, progress by running instead of by hopping, and have the habit of singing on the wing as a woodlark would do, though not to the same extent as a skylark. They have, however, two moults in a year, while the larks have only one. Three species are British: the Meadow Pipit, Titlark or Moss Cheeper (*A. pratensis*), by far the most common; the Tree Pipit (*A. trivialis*), which arrives in the British Isles in summer; and the Rock Pipit, or Rock Lark (*A. obscurus*). The first- and last-named species are resident.

Piquet, a game of cards of French, or probably Italian, origin, played by two persons with a pack of 32 cards, all those between ace and seven being rejected. The player cutting lowest deals, and the cards are dealt, two by two, until 12 are out to each hand, the remaining eight lying on the table as stock. The elder hand then discards five cards or fewer, drawing fresh ones from the stock, and then the dealer discards three or fewer, or none, according to his discretion. The game formerly consisted of the best of five games of 100 up, which was called Piquet au Cent and sometimes English

Piquet, but in 1873 a modified variety was introduced called Rubicon. The system of scoring and marking are somewhat complicated and must either be learned in actual play or studied from the text-books. An Italian origin for the game has been assumed, because it was developed from the game of Ronfa, of which there is earlier mention (1526) than there is of Piquet. In Spain it was styled Cientos and presumably introduced into England at the time of the marriage of Philip II. to Mary (1554), as Cent or Sant. This name fell out of use soon after Charles I.'s marriage to Henrietta Maria (1625) and the French name Piquet took its place.

Piracy. The crime of piracy or robbery and depredation on the high seas is an offence against the universal law of society—a pirate being, according to Sir Edward Coke, *hostis humani generis* ("an enemy of the human race"). As, therefore, he has renounced all the benefits of society and government and has reduced himself afresh to the savage "state of nature" by declaring war against all mankind, all mankind must declare war against him; so that every community has a right by the rule of self-defence to inflict that punishment upon him which every individual would, in a state of nature, have been otherwise entitled to do for any invasion of his person or personal property. By an early statute of the reign of Victoria, the crime of piracy was made punishable, at the discretion of the court, by transportation (no longer legal) for life or for any term less than 15 years or to be imprisoned for any term not exceeding three years. The pirate's calling has practically been stamped out, but in the classical period piracy had not become detestable or even dishonourable; "other times, other manners." As trade increased, however, the temptation was held out to rogues to grow rich easily, and seaborne commerce was pillaged for centuries. The Norsemen terrorised the coasts and shipping of the north of Europe. Even some of the famous sailors of the great Elizabethan period—gallant fellows, whose names are still household words—could not resist doing their country a good turn by harrying the Spaniards on sea and land. Then came the era of diabolical devastation, murder, and loathsome riot under the buccanniers, when Henry Morgan, Captain Kidd and a host of other dare-devils flourished. In Eastern seas, too, the Chinese and Malay pirates carried on their nefarious traffic until a comparatively late date, while the Algerine corsairs and Moorish rovers had ultimately to be put down by the British navy.

Piræus, a seaport of Attica, Greece, 5 miles S.W. of Athens, of which it is the harbour. It occupies a hilly peninsula. In ancient days Phalerum was the harbour, but Themistocles saw the value of the peninsular position, and began to construct the port. The Long Walls, connecting the new harbour with Athens, were built between 457 and 431 B.C. They were destroyed by the Spartans at the end of the Peloponnesian War, were restored by Conon, but were demolished by the Romans under Sulla in 86 B.C. At the beginning of the 19th century Piræus was little more than a fishing

village called Porto Leone. When, in 1834, the capital was transferred to Athens, the former name of the harbour was restored. Quays, piers, spacious squares and broad streets were constructed and the town soon began to prosper. The industries include the making of cotton and cloth, spirits, flour, soap and leather, besides engineering works and several shipbuilding yards. More than half of the total Greek imports pass through Piræus. Pop. (estimated), 50,000.

Pirmasens, a town of the Bavarian Palatinate, Germany, formerly capital of the county of Hanau-Lichtenberg, 40 miles W. by S. of Spire. The principal buildings are the Town Hall and church. The staple manufactures are musical instruments and boots and shoes. It is named after St. Pirmin, who preached the gospel in the locality in the 8th century. From the Count of Hanau-Lichtenberg it passed, in 1736, to Hesse-Darmstadt, of whose Landgrave, Louis IX., there is a fine monument in the church. On the 14th of September, 1793, the Prussians under the Duke of Brunswick defeated the French under Moreau in the immediate vicinity. Pop. (1900), 30,190.

Pirna, a town of Saxony, Germany, on the left bank of the Elbe, 11 miles S.E. of Dresden. It is well situated on the borders of the district popularly called the Saxon Switzerland. The former ramparts have been converted into promenades and among the chief buildings are the Sonnenstein, a castle erected on a hill above the town in 1573 and utilised as a lunatic asylum since 1811, the Gothic Hauptkirche dating from 1546, and the Town Hall. The sandstone quarries on both banks of the river provide employment for thousands of hands and the manufactures include tobacco, chemicals, pottery, leather and glass. Considerable traffic in grain, fruit and timber is carried on by means of the Elbe. Originally a Slavonic settlement, the town was annexed to Saxony in 1404. It prospered for a long time, but lost much of its importance through the Thirty Years' and Seven Years' Wars. The Prussians captured and dismantled it in 1758 and it was occupied by the French for a few months in 1813. Pop. (1900), 18,300.

Pisa, capital of the province of the same name, Italy, on the Arno, 6 miles from the sea, and 44 miles W. of Florence. The town has a citadel, and is surrounded by walls and ditches enclosing a circumference of more than 6 miles. It has handsome streets, good quays and fine houses. The 12th-century cathedral is of white marble, and has a dome supported on seventy-four pillars, and contains good paintings, sculptures and mosaics, some of which were designed by Cimabue. The Baptistery, completed in 1278, has also a dome 190 feet high. The famous Leaning Tower is 183 feet high, and 13 feet out of the perpendicular. It is believed that the campanile acquired its inclination while in the process of building and not from any design of the architects, Bonanno and Wilhelm of Innsbruck. A fine view is obtainable from the top. The cemetery called Campo Santo was founded in the 12th century by Archbishop Ubaldo,

who invested it with an exceptionally solemn character by laying down several shiploads of soil brought from Calvary. There are several beautiful churches in Pisa besides the Duomo. Other prominent buildings include the university (founded in 1338), the academy of fine arts, the royal palace, the archiepiscopal palace, the palace of the Order of St. Stephen and other notable palaces, the hospital, the market halls, and the Corn Exchange. The industries include silk, woollens, cottons, worsted, soap, white-lead, vitriol, corn and oil. The city of Pisa was anciently one of the twelve cities of the Etruscan federation, and maintained friendly relations with the Romans, of whom, however, there are few remains. Pillaged by the Goths after the fall of Rome, by the 11th century



THE LEANING TOWER, PISA.
(Photo: Frith & Co., Leigate.)

it had become a formidable republic, particularly strong by sea. It played a conspicuous part in the Second Crusade, but the prolonged period of strife with neighbouring states, especially with Lucca, Genoa, and Florence, ultimately ruined it. Siding with the Ghibellines, it maintained a heroic resistance against the Guelphs. The treachery of Count Ugolino della Gherardesca at last aroused the fury of the citizens, who flung him and his relations into a tower, thereafter named the Tower of Hunger, and left them to perish of starvation (1288). The humaner attitude of its enemies softened the misery of the Pisans in the 16th century, but their town gradually declined. Galileo was a native of the city. In 1409 a council met at Pisa to consider the schism in the Catholic church. The rival popes, Gregory XII. and Benedict XIII., having failed to attend were pronounced contumacious and Alexander V. was chosen in their stead. This only made confusion worse confounded, and it was not till the Council of Constance that peace was restored. Pop. (1901), 61,320.

Pisano, ANDREA, sculptor, whose right name was Andrea da Pontedera (Italy), where he was born about 1270. He learned the craft of goldsmith, but afterwards was an assistant of the sculptor, Giovanni Pisano, with whom he worked on the church of Santa Maria della Spina, in Pisa, and on other buildings. His masterpiece, one of the bronze doors of the Baptistery at Florence, in some respects the grandest work in bronze ever fashioned by the hand of man, was set up in 1336. He executed some of the panels for the Campanile at Florence and was also engaged on the Duomo. He was appointed architect to the cathedral of Orvieto in 1347 and died probably in the following year. Orcagna was his most distinguished pupil.

Pisano, GIOVANNI, sculptor, was born at Pisa in Italy about 1250. After assisting his father Niccola at home, he was employed at Naples from 1270 to 1274 on the Castel Nuovo. In 1283 he completed his fine work in the Campo Santo at Pisa. The elaborate high altar and reredos carved for the cathedral of Arezzo, adorned with figures and reliefs illustrating the lives of St. Gregory and St. Donato, whose bones are enshrined there, is his most magnificent design. The tomb of Benedict XI., in the church of San Domenico in Perugia (1304), representing the sleeping pope guarded by angels, has always been justly admired, though marred by the feebleness of the figure drawing back the curtain at the head of the recumbent pontiff. He died at Prato, near Florence, about 1330.

Pisano, NICCOLA, sculptor, was born about 1206 either at Apulia, near Lucca, Italy, or in the southern province of Apulia. Little is known of his life. He is said to have been occupied on the sculptures of the Castel Nuovo in Naples (1221). It is certain, however, that in 1237 he executed the graceful and delicate composition for the "Descent from the Cross" in the church of San Martino at Lucca. In 1260 he completed the magnificent marble pulpit for the Baptistery of Pisa, his *chef d'œuvre*. It is a high octagon on semi-circular arches, supported by nine marble columns, three of which rest on white marble lions. Some of the figures in the panels are rendered with classic grace and feeling. He was the author of the large pulpit in the cathedral of Siena (1268), which, if more splendid, is less beautiful than that at Pisa. His last great work was the fountain in the piazza at Perugia (1274). He died at Pisa in 1278.

Pisciculture, or REARING OF FISH, is a term now generally applied to the system of artificial hatching or rearing of fish, molluscs, or crustacea. The treatment of eggs has been so perfected that eggs can be sent across the ocean without any appreciable loss; the young fry can be carried safely for long distances. The objects in view in pisciculture are (1) the saving of a greater percentage than would survive in a natural state, and (2) the protection of the fry from many dangers. The process of fertilising and hatching, applied to the salmon, is somewhat thus:—The gravid salmon is held over a pan, into which are discharged the ova, and upon these the milt is squeezed from the

male, and the pan is tilted to ensure fertilisation. Water is then added, and the pan allowed to rest for a time, after which the milt is poured off, and the eggs are left to hatch. After hatching, the young remain for six weeks in water among gravel, and then are fed with yolk of eggs and beef until the time when they are fit to be turned out to find their own food in more or less protected water. Sir James Gibson Maitland at Howietoun on Loch Coulter, 4 miles south-west of Stirling, reared 98 per cent. of the eggs treated, and 4,000,000 ova could be matured in one season at the breeding-ponds. Salmon-breeding is also conducted on a large scale at Stormontfield on the Tay, 4 miles north of Perth. Stephen-Ludwig Jacobi in the 18th century tried artificial hatching in Westphalia, and John Shaw applied it to salmon on the Nith in Dumfriesshire in 1837, while Rémy and Géhén applied it to trout in France in 1841. In 1848 the French Government established a hatching-station at Hünningen near Basel. The United States Commission of 1871 did much to advance the knowledge of the subject, and in the United States, Canada, Newfoundland, and Norway sea hatcheries have been in effective operation for several years.

Piscina, a stone basin, usually draining to the earth, in which the priest washes his hands before the celebration of the Lord's Supper and washes the cup after celebration. It was generally formed at a convenient height from the floor under a niche in the wall near the altar, or on the south side of the choir. Among the Romans a piscina was a private or public fishpond and also a bathing or swimming pond of hot or cold water in their baths.

Pisgah, the mountain, in Palestine, from which Moses viewed the Promised Land before his death. It is identified with Mount Nebo, which forms part of the range of Abarim, 2½ miles east of the north-east extremity of the Dead Sea. Its altitude above sea-level is 2,644 feet, and from its summit are visible the Jordan Valley and the Dead Sea.

Pishin, a district of British Baluchistan, on the southern boundaries of Afghanistan, immediately to the north of Quetta, and the point of junction of the roads from Kandahar to the Punjab and Sind. Its military importance made it a desirable object for Great Britain to gain, and since 1878 it has been under British control. The district contains 3,600 square miles, and is surrounded by mountain chains that in parts attain a height of 1,100 feet. Ranges of hills separate the valleys of the interior, through one of which a railway passes. The people, who are partly nomad, trade with India in horses, and cultivate cereals, maize, and melons. Pop. (estimated), 60,000.

Pisistratus, Tyrant of Athens, was born about 605 B.C. He was in early life associated with Solon, who was his second cousin; but afterwards, in order to promote his schemes of personal aggrandisement, he put himself at the head of the Diacrioi, a party which in effect he had formed to further his own ends. Having persuaded the Athenian people to grant him a bodyguard, he took possession of the Acropolis, and maintained his

power for eight years (560-552), at the end of which he was expelled by the aristocratic party. After a period of exile in Euboea, he returned to Attica in 541 and, after defeating his adversaries at Pallene, again made himself master of the city. After reigning peacefully for fourteen years, he died in 527, and was succeeded by his sons Hippias and Hipparchus. The rule of Pisistratus was at once firm and mild. He introduced useful social reforms, erected many beautiful buildings, and gave a great stimulus to literature by his concern for the arrangement and due recitation of the Homeric poems.

Pistachio (*Pistacia vera*), a small tree belonging to the terebinth family and native to western Asia, but now largely cultivated in southern Europe for the sake of its edible seeds. It has pinnate leaves of three or five leaflets, clusters of small apetalous unisexual flowers, and oval drupaceous fruits nearly an inch long, containing the bright-green kernel. These kernels are largely eaten by Turks and Greeks, and now enter into French and other kinds of confectionery. They are sometimes called "green almonds."

Pistil, a somewhat ambiguous term, applied either to the gynecium or entire female reproductive apparatus in a flower, or to the individual carpels in an apocarpous polycarpellary gynecium. In the latter case each pistil consists of an ovary containing the ovules, a stigma to receive the pollen, and generally a style or column connecting the two. In this case, as in the buttercup or rose, a single flower may be furnished with numerous pistils. In the former case, though stigmas and styles may be distinct, as in grasses or carnations, the ovary may be united, and either one-chambered internally or with as many, or twice as many, chambers as there are carpels. [CARPEL.]

Pistoia, a town of the province of Florence, Italy, near the left bank of the Ombrone, a tributary of the Arno, 21 miles N.W. of Florence. In the Middle Ages the town was remarkable for the great number of its cunning artificers in silver, and many examples of their genius still remain in several of the churches. In the 12th-century cathedral of San Jacopo is a marvellously fine silver altar. In the nave of Sant' Andrea is the pulpit designed by Giovanni Pisano, in imitation of his father's in Pisa. Among other notable buildings are the Palazzo del Comune and Palazzo Pretorio, both interesting examples of the Italian domestic architecture of the 14th century, and the Ceppo hospital, with some beautiful work in terra cotta. The manufactures include steel and iron wares, agricultural implements, musical instruments, paper, oil, woollens, silks, and firearms, including pistols, which were first made here and derived their name from the town. Pop. (estimated), 32,000.

Pistole, an obsolete gold coin of Europe. It was originally Spanish, and was adopted in Italy, Germany and Switzerland. At the time it ceased to be coined its value was 16s. of current money. The name was also given to the louis d'or of gold issued in 1640 by Louis XIII. An ingenious theory

has been suggested for the origin of the name. As a pistol was smaller than a gun, and this coin was smaller than a crown, the designers of it decided to call it a pistole. The conjecture, however, leaves something to be desired.

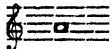
Pita, the Mexican name for the fibre obtained from the leaves of the larger species of Agave or maguey, the so-called Mexican aloe, and also from Bromelia Pinguin and B. Karatas, Central American plants allied to the pine-apple. The fibre is a valuable one, adapted for the manufacture of the best paper and, in consequence of its great strength, for cordage. It is also known as pita-flax, pita-hemp, and pita-thread.

Pitcairne, ARCHIBALD, physician and poet, was born in Edinburgh on Christmas Day, 1652, and was educated at Dalkeith School and Edinburgh University. He originally intended to study for the law, but when in Paris took to medicine instead and graduated at Rheims. He began practice in Edinburgh, and was one of the founders of the Royal College of Physicians in that city (1681). In 1688 he published *Solutio Problematis de Historicis*, vindicating William Harvey's claims as discoverer of the circulation of the blood. So highly was this work esteemed, Pitcairne was invited to fill the chair of physic at Leyden, and he spent a year there lecturing to the students. On his return to Edinburgh (1693) he engaged in several bitter controversies, both professional and political (for he was a keen Jacobite), and for a time his membership of the College of Physicians was suspended. Peace was called in 1696, and in 1701 he was elected a Fellow of the College of Surgeons. During the next few years he was diligently occupied in the publication of several learned medical dissertations, but his caustic tongue again embittered his relations with the Presbyterians, who denounced him as an atheist. If he were the author of *The Assembly, or Scotch Reformation* (1692), and *Habel* (1692), the former a comedy, the latter a satirical poem, both imputed to him, it was no wonder he was obnoxious, for they are witty and ribald attacks on the kirk and the leading divines. His Latin poems (1727) are of great merit, and valuable for their contemporary allusions. Though one of the most distinguished physicians and practitioners of the period he died poor. His death took place in Edinburgh on October 20th, 1713.

Pitcairn Island, in the South Pacific, situated in 25° 5' S. and 130° 5' W. It is 2½ miles long by 1 mile broad, with steep coasts bordered by reefs, with only one entry on the west and one (Bounty Bay) on the north. The principal products, natural and cultivated, are cocoanut, plantain, banana, pandanus, orange, breadfruit, sweet potatoes, yams, taro, melons, pumpkins, maize, sugar-cane, pine-apple, and arrowroot. The soil is well adapted for coffee. Pigs, once common, are extinct, but there are some wild goats and chickens. As stone axes, skeletons and other remains prove, the island must have been previously tenanted, though when discovered by Admiral Philip Carteret on July 2nd, 1767, it was uninhabited. In 1790 it

became the refuge of the mutineers of the *Bounty* (consisting of Fletcher Christian, the ringleader, eight other Englishmen, six Polynesian men and twelve Polynesian women), and within a few years all the men save Alexander Smith, who changed his name to John Adams, were dead of drink or murder. The remnant was discovered in 1808 by Captain Mayhew Folger, of the American ship *Topaze*, and, under Adams's care, they were being educated and trained in Christian principles. They were afterwards visited at more or less distant intervals. In 1856 the islanders, having become too many for the island, were transferred to Norfolk Island, but forty of them afterwards returned. The island was annexed to Great Britain in 1838. Pop., 169.

Pitch, the black, brittle, glossy solid residuum after the distillation of wood-tar. That made in England, Sweden, Finland and Russia is the product of the Northern Pine or Scots Fir (*Pinus sylvestris*). Burgundy pitch is obtained from the spruce (*Picea excelsa*). Coal-tar is a by-product of the distillation of coal for the manufacture of gas. Both varieties are related to the bitumen, asphalt, pitch and petroleum that occur naturally in different parts of the world. The famous pitch-lake of La Brea in the island of Trinidad, in the British West Indies, yields every year many thousand tons of native pitch.

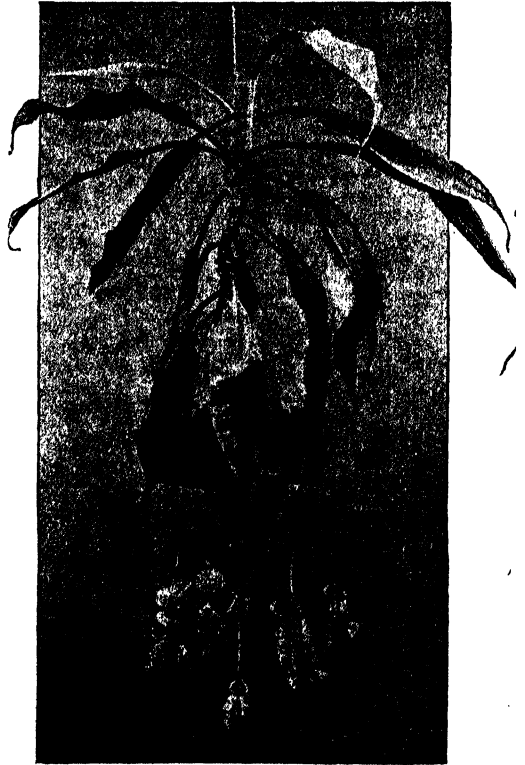
Pitch, in acoustics, is that characteristic of a sound or musical note which depends on the number of vibrations per second of the sounding body. The greater the number of vibrations per second the higher is the pitch, and this would be popularly expressed by saying that the note was shriller or more acute. Whenever two notes are of the same pitch—it matters not how they are produced—their rates of vibration are equal. If a singer and a tuning-fork produce the same note, the vocal cords of the one are moving to and fro in the same time as the prongs of the other. It is easy to determine the number of vibrations in any note by means of the syren or by choosing a tuning-fork which gives the same note and finding the number of vibrations of the tuning-fork in a special manner. [TUNING-FORK.] For use in tuning different musical instruments, it is desirable to have a reference standard of pitch. For this the note *a'*  is usually chosen, but unfortunately

there is no universal agreement as to its value. In physics, the note *c'* (the middle c on the piano) is generally taken as 256, which would give *a'* as 426.6. Concert pitch has been constantly rising. In the early part of the 18th century *a'* was 424, and organ pitch, a century later, used *a'* = 388. Whatever number is chosen for this fixes the value of all the other notes. In stringed instruments the pitch of a note depends on the length of the vibrating string, on the tension, and on the weight. In a violin, for instance, a finger placed so as to shorten the vibrating part of the string causes the production of a higher note. The heavier bass string gives a lower note on account of its extra weight. In wind instruments the note

is produced by the vibrations of a column of air, the longer the column the lower being the note emitted; this is most simply exemplified by the pipes of an organ.

Pitchblende, a mineral found in England (Cornwall), Turkey and other countries, which is interesting as being the chief ore and source of the metal uranium. It consists of oxides of this element, possessing the formula U_3O_8 , but usually contains iron, silica, lead and other substances as impurities, and is of a black and massive appearance, occurring in brilliant octahedral crystals (specific gravity, 9.35).

Pitcher-Plants, the isolated genus *Nepenthes*, belonging to the Indian monsoon region, and other plants (such as the Australian member of the saxifrage family *Cephalotus follicularis*, and the American *Sarraceniaceæ*) in which the leaf is modified into an ascidium or pitcher. Though varying in details, the pitcher generally develops



PITCHER PLANT.
(*Nepenthes Amesianana*.)

by intercalary tubular growth, like a peltate leaf. In the *Sarraceniaceæ* it is sessile; in *Cephalotus*, shortly petiolate; in *Nepenthes*, furnished with a long and partly winged petiole. The apical part of

the leaf-blade commonly forms a raised lid to the pitcher, and its margin is often strengthened by inrolling. Remarkable external flanges sometimes exist, and these and the mouth of the pitcher may be baited by honey-secreting glands. Internally the throat of the pitcher is generally smooth; but lower down are downward-pointing hairs and a surface studded with glands. Some of these glands excrete a neutral watery liquid. In *Nepenthes*, as soon as any insect or other nitrogenous matter has found its way into this liquid, it becomes acid, digestive ferments (zymases) are discernible, and a true digestion takes place, resulting in the formation and absorption of peptones. In the *Sarraceniaceæ*, though the liquid seems to have a remarkable asphyxiating effect upon insects, like oil rather than water, no digestion seems to take place, the leaf merely absorbing the liquid products of decomposition. In *Dischidia*, it would seem, the function is altogether distinct, water-storage rather than insect-eating being aimed at.

Pitch-pine, the most valued pine-timber of the United States, largely employed in American dock-yards and exported in immense quantities to Great Britain. It is the wood of *Pinus australis* (sometimes called *P. palustris*), the Georgia pitch-pine or yellow pine of the Southern States, one of the group with three needle-leaves on each dwarf-shoot. It grows on the sandy "pitch-barrens" of Georgia, Florida and Carolina, and yields much tar and turpentine as well as timber. Its bright green needles are often a foot long. *P. rigida*, the pitch-pine of the northern States, with short dark green needles, is more commonly used for fuel.

Pitchstone, so called on account of its resinous lustre, is a glassy volcanic rock, agreeing in chemical composition with felsite. It contains abundant microliths, and occasionally in cooling has developed that combination of rectangular and concentric shrinkage known as perlitic structure. Its average silica percentage is 70, and its specific gravity 2.3. It occurs in the Islands of Arran, Bigg, etc.

Pith, the central conjunctive tissue of the root and stem, known technically as the medulla. It varies considerably in amount, being relatively largest in such underground structures as potato-tubers, in herbaceous stems, and in the elder. Its cells may become prosenchymatous; but seldom become sclerotic. They generally lose their protoplasmic contents at an early stage, and either shrivel up or are ruptured by rapid elongation of the organ. Thus, in the centre of a sound oak stem the pith remains as a line of dust-like cells; whilst in the internodes of most grasses (straw, bamboo, etc.), and throughout the aerial stems of many herbaceous perennials among the Umbellifera and Compositæ it is so ruptured as to leave a hollow stem.

Pithom, a treasure or store city of the Pharaohs, for whom it was built by the children of Israel. Its site occasioned much controversy for a lengthened period until Dr. Naville (for the Egypt Exploration Fund), in 1883, identified it with Tel el-

Maskhuta, in Egypt, between Ismailia and Tel el-Kebir, on the Freshwater Canal and the Cairo and Ismailia Railway. Dr. Naville was enabled to prove that, in the Greek age, the name of Pithom had been changed to Heropolis, which the Romans shortened to Ero and Strabo called Hero. Excavation has shown it to be a square enclosed by a wall 22 feet thick, and measuring 650 feet each way. The enclosed ten acres are divided by walls about 10 feet thick into chambers, which were entered from above. A temple also was discovered, and both city and temple were built by Rameses II., who would thus be the Oppressor of the Israelites.

Pitlochry, a health resort of Perthshire, Scotland, 13 miles N.N.W. of Dunkeld. Finely situated on the left bank of the Tummel, its close proximity to some of the most beautiful Highland scenery and its pure, bracing mountain air have given it a great vogue among holiday-seekers. It lies near the south-eastern extremity of the renowned Pass of Killiecrankie and the famous Queen's View (the queen in question being Victoria) and Falls of the Tummel. The industries comprise the making of tweeds and plaids, and whisky is distilled. Among the buildings are the churches of the Established, United Free and Episcopalian bodies, besides two handsome hydropathics. Dr. Alexander Duff (1806-78), the (United) Free Church missionary in India, was a native of the parish of Moulin (in which Pitlochry is situated), and a Celtic cross has been erected to his memory. The prosperity of Pitlochry as a health resort dates from 1845, when Queen Victoria visited Blair Castle. Pop. (1901), 1,541, greatly augmented in summer.

Pitman, SIR ISAAC, originator of the system of shorthand which bears his name, was born at



SIR ISAAC PITMAN.

(Photo: Friese, Greene, Simpson & Co., Bath.)

Trowbridge, Wiltshire, England, on January 4th, 1813, and was educated in Trowbridge grammar school and privately. He was a teacher for several

years, but was dismissed at Wootton-under-Edge, Gloucestershire, for joining the Swedenborgian church, of which throughout his life he continued to be an active member. In 1839 he opened a school in Bath and conducted it for four years. Having for many years been convinced of the benefit of shorthand, which he had learned according to Taylor's system, Pitman published *Stenographic Sound Hand* in 1837. A second and improved edition appeared in 1840 and further editions were issued at frequent intervals. He gave up teaching in order to devote his time to the new pursuit, which was successful to a degree beyond all expectations. The *Phonetic Journal* was first brought out in 1842 and editions of the Bible, *Pilgrim's Progress* and many other classics were printed in phonographic shorthand characters. Pitman's system was adapted to the languages of the foremost countries of the world. Having established shorthand commercially, Pitman set himself to reform spelling, which he proposed to effect on the phonetic plan. In this cause he laboured zealously but to very little purpose. The Jubilee of Phonography was celebrated in London in 1887 under the presidency of the Earl of Rosebery, and in 1894 Pitman was knighted in recognition of his "great services to stenography and the immense utility of that art." He died in Bath on January 22nd, 1897.

Pitré, GIUSEPPE, writer on folk-lore, was born at Palermo, the capital of Sicily, on December 23rd, 1841. After the war of Liberation, he graduated in medicine (1866), but having become fascinated by the study of folk-lore, he devoted himself almost exclusively to this subject, his industry and research being witnessed to by a large number of valuable works. His chief are comprised in two series, *Biblioteca delle Tradizioni Popolari Siciliani* (19 volumes, 1870-91), and *Curiosità Popolari Tradizionali* (10 volumes, 1885-91), but he has also been a regular contributor to the folk-lore quarterly *Archivio per lo Studio delle Tradizioni Popolari*, which he helped to establish (1880) and of which he is co-editor.

Pitt, WILLIAM, statesman, second son of the great Earl of Chatham and Lady Hester Grenville, was born at Hayes, near Bromley, Kent, England, on May 28th, 1759. He went into residence at Pembroke Hall, Cambridge, in 1773, and in 1780 was called to the Bar and went on the Western Circuit. His political career began in the autumn of the same year, when Parliament was dissolved, and he was elected for Appleby in Westmoreland. His first speech was delivered on February 26th, 1781, in support of Burke's scheme of Economical Reform and made a deep impression on the House. In 1782 he refused Rockingham's offer of the Vice-Treasurership of Ireland, which was not a Cabinet office (he had declared he "would never accept a subordinate situation"), and later in the same year (July 6th) joined Lord Shelburne's Ministry as Chancellor of the Exchequer and leader of the House of Commons, at the age of twenty-three. In February, 1783, Lord Shelburne was displaced by the Coalition, and when this administration came

to an end in December of the same year Pitt, being then in his twenty-fifth year, undertook to form a Ministry, although there was a majority against him of nearly two to one. So masterly was his conduct of affairs that by the beginning of March, 1784, the adverse majority had dwindled down to one, while in the country his policy excited vehement enthusiasm. He now dissolved Parliament, was returned for the University of Cambridge (a seat he held till his death), and found himself supported by a large majority. When the French Revolution degenerated into the tyranny of a sanguinary mob he placed himself at the head of the opposition to France. His war administration was not fortunate



WILLIAM PITT.

(From the Portrait by John Hoppner, R.A.)

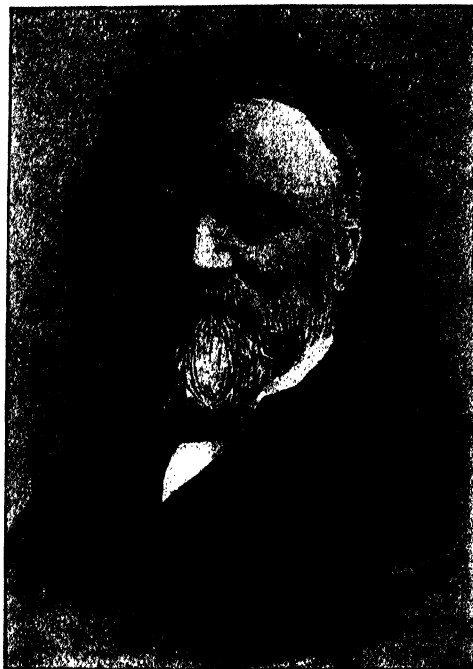
but, in spite of this, his home policy was such as to preserve to him the confidence of the nation at large. Among the questions which he dealt with during his first premiership were electoral reform, which the hostility of George III. forced him to abandon; the government of India, in which he achieved a striking success; the reduction of the National Debt and the revision of taxation and of trade duties; the impeachment of Warren Hastings, in which, however, he took no active part; the abolition of the slave trade; the Regency, and the parliamentary union of Ireland with Great Britain. It is impossible to defend the means by which Ireland was prevailed upon to part with her Parliament; but it is to be remembered in Pitt's favour that, if he was not superior to the employment of corruption as a means of government, he was personally incorruptible, although his financial

affairs were deeply involved. As to the policy itself, it is impossible to judge it with certainty, since the obstinacy of the king prevented it from being fully carried out. An essential part of it, in its author's estimation, was Roman Catholic emancipation; and, being unable to overcome the king's fanatical aversion from this, he in 1801 (March 14th) resigned, after having held office for seventeen years. For a time he was content to support Addington, but when he saw that his successor's war measures were inadequate his attitude changed; and, as the consequence of his attacks, the Ministry resigned in 1804, and, on May 10th, he resumed office as First Lord of the Treasury and Chancellor of the Exchequer. His aim at a time of national difficulty and danger was to form a government which should include the best men of all parties; but the king's hatred of Fox was implacable, and he had to content himself with a Tory Ministry. His energy and resource in the crisis in which the nation now found itself were almost incredible; but his policy met with reverse after reverse. In April, 1805, the Opposition proposed a vote of censure on Lord Melville, the Treasurer of the Navy in his former administration, for mismanagement, and the carrying of the motion by the Speaker's casting vote, in spite of Pitt's strenuous defence, was felt by him as almost a vote of no confidence in himself. At this time he was concluding a treaty with Russia to serve as the basis of another European confederation against Napoleon, and when in August Austria joined the coalition and was followed by Sweden, his hopes of bringing his Continental policy to a triumphant issue rose high; but on October 19th Mack, with thirty thousand Austrian soldiers, capitulated at Ulm, and the news was little less than a death-blow to Pitt, in spite of the glorious victory at Trafalgar two days later. His health was by this time sadly shattered, and early in December he went to Bath for rest and treatment. There it was that intelligence reached him of the overthrow of the Russians and Austrians at Austerlitz. This calamity was more than his broken health and spirits could bear. He travelled back to Putney in January for the opening of Parliament on the 21st, but was too ill to be present, and death came two days later (January 23rd, 1806). Pitt was never married. At one time of his life he formed an attachment for Eleanor Agnes Eden, the eldest daughter of Lord Auckland, but his pecuniary embarrassments prevented him from prosecuting it, and the lady afterwards became the Countess of Buckinghamshire.

Pittenweem (Gaelic, "the town of the cave"), a seaport of Fifeshire, Scotland, on the northern shore of the Firth of Forth, 11 miles S. of St. Andrews. It became a royal burgh in 1542, and on a hill above the harbour stand the scanty remains of the priory to which it was once attached. Till the middle of the 17th century its trade was considerable, but it suffered then a serious decline. However, it still preserves much of its old-world aspect. It was here that Wilson and Robertson effected the robbery of the collector of the excise (1736), which eventuated in the Porteous mob so

thrillingly described by Sir Walter Scott in *The Heart of Midlothian*. The industries comprise fisheries, fish-curing, cooperage, and sail-making. Pop. (1901), 1,950.

Pittsburg, or Pittsburgh, capital of Alleghany county, Pennsylvania, United States, mostly situated on the tongue of land between the Alleghany on the north and the Monongahela on the south, the union of the streams below the city forming the Ohio, 260 miles W. by N. of Philadelphia. At the tip of the tongue stood the French outpost of Fort



ANDREW CARNEGIE.

(Photo: A. Macintyre, Dunfermline.)

Duquesne, erected in 1754, where General Braddock suffered his fatal reverse at the hands of the Indians in 1755. When the British recovered the stockade (1758) they built a new fort which was named Fort Pitt, after the first Earl of Chatham, who was then Prime Minister of Great Britain. These forts formed the nucleus of the present city of Pittsburg. Its position near the junction of the two rivers, and the fact of its being a leading railway centre, give it exceptional facilities for trade. The surrounding scenery is fine, and the use of a supply of natural gas for industrial purposes renders it almost free from smoke. The principal buildings include the court-house, city hall, the Exposition buildings, the Episcopalian and Roman Catholic cathedrals, the Carnegie Library and Institute, the Phipps Observatory, the Western University of Pennsylvania, the Pennsylvania College for Women, and Pittsburg Academy. Of several parks the most

notable are Schenley Park (422 acres) and Highland Park (366 acres), in the latter of which a zoological collection is maintained. Pittsburg is the headquarters of the iron and steel trade in the United States, one-half of the total yield of steel and one-fourth of the total output of pig-iron in the Union being produced here. The works are on the most colossal scale, some of the blast-furnaces being the largest in the world. Other prominent industries are the making of glass, electrical apparatus, locomotives and railway plant, machinery, stoves, silver-plated and other wares, cork, aluminium, tin, brass and copper goods, earthenware and bricks. The coalfield is one of the richest on the earth, and oil and natural gas also are derived from apparently inexhaustible sources. Andrew Carnegie, who arrived in 1848 a boy of eleven, in course of time became the greatest ironmaster of his day. Pop. (1860), 49,217; (1900), 321,616.

Pityriasis, a form of skin eruption attended with bran-like desquamation. It generally affects the head, and is commonly known as "scurf" or "dandruff." When the head is brushed little scales fall in showers. This condition may also occur at the bends of the joints or in patches on the body. When it takes a severe form the hair may come out in considerable quantities, or grow thin, though not necessarily involving baldness. The head must be kept clean, and a hard brush should not be used. An ointment compounded of precipitated sulphur, cocoa-butter, castor-oil, and balsam of Peru should be rubbed into the scalp every night, and tincture of Spanish fly may be added if the hair is falling out much.

Pius, the name of many of the Popes, the first to bear it being the tenth Bishop of Rome, who flourished between A.D. 142-157. PIUS II. was Æneas Silvius Piccolomini, born at Corsignano in Siena on October 18th, 1405. He was secretary to several bishops, and took the side of the council which deposed Eugenius IV., though he afterwards supported him. He was successively Bishop of Trieste and Siena, and was made cardinal by Calixtus III., whom he succeeded as Pope in 1458. He tried to organise a crusade against the Turks, but failed, and the disappointment in this—one of his great projects—is said to have hastened his death at Ancona on August 15th, 1461. He wrote some valuable geographical and historical works. PIUS III. (Antonio Todeschini, who assumed the name of Francesco Piccolomini) was nephew of Pius II. He was born at Siena in 1431, was made Bishop of Siena at the age of twenty-two, and was elected Pope on September 22nd, 1503, dying on the 18th of October following. PIUS IV. (Giovanni Angelo Medici) was born in Milan on March 31st, 1499. He was elevated to the Papal see in 1559, and was a sagacious and temperate ruler, who instituted various reforms in Church worship. It was during his reign that the famous Council of Trent (1562) was held. He died on December 9th, 1565. PIUS V. (Michele Ghislieri) was born at Bosco, in Piedmont, on January 17th, 1504, and became Pope in 1566. He made ruthless war on heretics and Protestants, and issued a bull against

Queen Elizabeth, which had no effect. He assisted Charles IX. of France to put down the Huguenots, and during his tenancy of the holy see the Inquisition was at its worst. He died on May Day, 1572. In 1775 Giovanni Angelo Braschi was chosen Pope under the style of PIUS VI. (born at Cesena, in the States of the Church, on December 27th, 1717), being then nearly sixty years of age. He tried hard to re-establish the Papal authority, which had been weakened under some of his predecessors, on its old basis, and disputed with Joseph II. of Germany as to Papal jurisdiction over his court. The French Revolution broke the close connection which had existed between the Papacy and France; 130 bishops and 60,000 clergy refused to recognise the new French constitution, and Louis supported them. The Republican agent having been killed in Rome, Napoleon Bonaparte and the Convention threatened war, and in 1796 the Pope was obliged to agree to terms which condemned him to pay a large tribute and to yield up the northern Italian provinces. Later, fresh troubles led to the capture of Rome by the French and to his imprisonment, from the hardships of which he died (at Valence in the department of Drôme) on August 28th, 1799. PIUS VII. (Gregorio Luigi Barnaba Chiaramonti) was born at Cesena on August 14th, 1742, and was elected Pope in 1800, entering Rome after having made a concordat with France. He got back the Papal States in 1801, and was known for his mildness and wise moderation. He went to Paris with great pomp in 1804 and anointed Napoleon, and returned in 1805 without receiving, as he had desired, any concession. He declined to acknowledge Joseph Bonaparte as King of Naples, which had been conquered by the French who, in February, 1808, again captured Rome. In spite of threatened excommunication, Napoleon united various Papal provinces to the kingdom of Italy. Pius was arrested, carried off to Grenoble, Savona and Fontainebleau, and forced practically to renounce his claims, and when he retracted he was again arrested, and was not allowed to enter Rome until after Napoleon's fall. His beneficent reign closed on August 20, 1823. PIUS VIII. (Francesco Xaviero Castiglioni) was born at Cingoli, near Ancona, on November 20th, 1761, became Pope in 1829, and died on November 30th, 1830. PIUS IX. (Giovanni Maria Mastai Ferretti) was born at Sinigaglia, near Ancona, on May 13th, 1792, and had intended to adopt a military career, but finally decided on entering the Church. In 1827 he became an archbishop, and in 1840 a cardinal. His election to the Papacy in 1846 promised well, as benevolence and goodness were his most strongly-marked characteristics. He reformed many abuses and was prevented from carrying out other improvements by the revolution of 1848. His minister, Count Rossi, was assassinated, and even his own palace attacked, and he was forced to flee from Rome in disguise. A republic was formed at Rome in his absence, and this was replaced by French troops, who gained possession of the city in 1849 after a brief struggle, the Austrians meanwhile holding the northern provinces. In 1854 Pius promulgated the doctrine of the Immaculate

Conception. The Sardinians, who had revolted in 1860, gradually overpowered the Roman States, and their king was appointed sovereign. The French, who had undertaken to defend Rome, were obliged to withdraw when the Franco-German War broke out, and Victor Emmanuel's troops entered the holy city. By a fatal error of judgment Pío Nono chose, at this critical period (1869), to convene the Vatican Council which first affirmed Papal Infallibility as a tenet of the Catholic Church. The dogma alienated many good Catholics in every country, and added still further to the embarrassments and anxieties of the Holy Father. After the unification of Italy Pius retired into the Vatican, where he lived in seclusion till his death on February 8th, 1878. It was he who, in 1850, first divided England into Catholic dioceses. Pius X. (Giuseppe Sarto) was born at Riese, near Venice, on June 2nd, 1835. He was appointed Bishop of Mantua in 1884 and, in 1893, Cardinal and Patriarch of Venice. He succeeded Leo XIII. in the pontificate on the 4th of August, 1903. A man of simple tastes, with no pretensions to the classical and lettered attainments of his predecessors, he entered upon a contest with the French Republic in 1906, requiring the Catholic bishops and priests to ignore the law of Associations passed in 1905, which assimilated public worship with public meetings.

Pizarro, FRANCISCO, the conqueror of Peru, was born about 1476 at Truxillo in Estremadura, in Spain. He was a natural son, and his early history is obscure; but it is known that his father was a soldier of distinction. He received absolutely no education and was never able to read or write, and enlisted as a soldier in order to give up his occupation as a swineherd. His courage and his wily manner speedily procured him promotion; and, his cupidity being as marked as his ambition, the conquest of Mexico by Cortez induced him to join with another soldier named Almagro, in 1524, in an expedition to Peru, of which little was then known. Pizarro had previously been engaged in a voyage of discovery, as he was one of those with Balboa when the latter discovered the Pacific Ocean. The funds for the Peruvian expedition were provided by a priest. Save that it revealed a rich country and many possibilities of plunder, this expedition did not yield much profit, and the sufferings of those who undertook it were terrible. Another voyage was accomplished in 1526-7, and this time the supreme importance of securing the country was fully recognised. Pizarro and his companions brought away much spoil, and were determined to seek the aid of the Government in their project, seeing how few they were in number and their lack of money, though they first tried to get help from the Governor of Panama, who refused to assist them. Pizarro arrived in Spain in 1528, and obtained an interview with Charles V. at Toledo, unfolding his plans and expatiating on the results of a successful expedition to Peru. It was July, 1529, however, before he obtained the royal sanction. He was appointed governor of the territory to be annexed, which received the name of New Castile. Securing the help of his brothers and other adventurers,

Pizarro embarked in 1531 with three ships, leaving Almagro to follow with such help as he could get. At this time Peru was tormented by a civil war, which proved Pizarro's opportunity. The Inca emperor Huayna Capac had died and his two sons were fighting for the throne. The victorious son, Atahualpa, did not recognise the gravity of the Spanish invasion, nor the ease with which Pizarro's handful of men could be annihilated. Pizarro professed peace when the hostile forces met and invited Atahualpa—the last of the Incas—to a banquet, where he was arrested and his followers were massacred. The butchery which followed was frightful. The Peruvians, utterly demoralised, were slaughtered in thousands. Pizarro forced Atahualpa to disclose all his treasure and then ordered him to be burnt as a conspirator, but mercifully allowed him to be strangled first on his becoming a Christian. His cruelty so effectually cowed the Peruvians that Pizarro held his course uninterruptedly. He founded Lima in 1535, and but for his savage treatment of Almagro, whom he put to death, might have reigned for many years. He was created a marquis, but was assassinated with his brother on June 26th, 1541, by the friends of his murdered companion Almagro.

Pizarro, GONZALO, youngest brother of the preceding, was born at Truxillo in Estremadura, in Spain, about 1506. He accompanied Francisco Pizarro to Peru and took an active part in its conquest. During his absence on an expedition to Quito, when he and his followers nearly perished of hunger and hardship, his brother was assassinated, and on his return Gonzalo retired to Charcas (1542). He was, however, induced to leave his retreat to dispute the rule of the new viceroy, Blasco Núñez Vela, who had arrived from Spain to govern the country with some regard for the rights of the Indians, a policy which the Spanish settlers strenuously resisted. Vela declined a contest and Gonzalo made himself Governor of Peru. Two years later Vela was slain and there was none to gainsay Gonzalo's supremacy. The Spanish king, however, had to be reckoned with. In 1547 Pedro Gasca came to restore the royal authority and Gonzalo deemed it discreet to withdraw to Chile. Victory over a force that had hung upon his rear seemed to turn his head and he determined to fight for sovereignty. He advanced on Cuzco to accept battle, but so many of his men deserted that he surrendered to Gasca, who ordered him to be beheaded on the spot on April 8th, 1548.

Pizzicato (Italian, *pizzicare*, "to pinch"), a term used of the music for the violin, viola, violoncello and double-bass, denoting that the passage so marked is to be rendered by plucking the strings with the fingers instead of playing it with the bow. The passage is generally marked "pizz." and the plucking or twanging is continued as far as the phrase *col arco*, or simply *arco*, which indicates that there the bow is to be resumed. Pizzicato is sometimes performed with the left hand and sometimes with the right and may be resorted to in orchestral and chamber music as well as in solo pieces. It appears to have been introduced in

the Italian score some time in the first half of the 17th century.

Placenta, a complete organ, formed partly from the inner walls of the uterus of the parent, and partly from parts of the foetus, by which the latter is nourished during its intra-uterine life. It is, in fact, a specially-modified secreting gland to which the blood-vessels of the foetus act as ducts. The placenta is characteristic of Mammalia; but varies considerably in development in the various subdivisions of the class. The term is by analogy extended to the spongy tissue from which the ovules spring in spermatophytic plants. [PLACENTATION.] This often serves also as a conducting tissue for the growth of the pollen-tube to the micropyle.

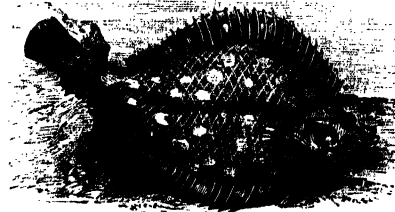
Placentation, the arrangement of the ovules on the soft spongy tissue known as the placentas. In a few cases a single ovule, or a placenta bearing several ovules, appears to be a direct prolongation of the floral axis, independent of the carpellary leaves which may form an ovary round it. This is termed axial placentation. It occurs in the solitary gymnospermous ovule of the yew; in the similarly solitary terminal ovules of the reed-mace (*Typha*), the rhubarb tribe (*Polygonaceæ*), and the peppers (*Piperaceæ*); and in that in the inferior ovary of the walnut tribe (*Juglandaceæ*). In the *Compositæ* one ovule arises from the base of the inferior ovary; but it is lateral to the axis, the apex of which is visible beside it, so that the ovule is homologous to a leaf, as also in the gymnospermous *Ginkgo* and in the primrose family, where the placenta bears several lateral ovules. In a few cases, as in water-lilies, poppies, etc., the ovules are produced all over the inner surface of the carpellary leaves. They are then termed superficial, and are generally somewhat rudimentary in structure, being probably homologous to trichomes. In the majority of flowering-plants the placentation is marginal, the ovules corresponding to lobes or leaflets of the carpellary leaf. In most one-chambered ovaries the margins of the carpellary leaves form the spongy placentas and bear the ovules, often in double rows, each row belonging to one leaf-margin. This is termed parietal placentation. In *Cruciferae* we have the exceptional case of parietal placentation in a two-chambered ovary, the margins of the two carpellary leaves splitting, and one half growing inwards so as to form the partition or replum, while the other half bears the ovules. Many-chambered ovaries are so mainly from the infolding of the margins of carpellary leaves which form the septa or dissepiments between the chambers (*loculi*). In poppies and cucumbers this infolding is only partial; but in lilies, iris, etc., these septa unite to form a central placenta which has been termed axile. In the pinks and other *Caryophyllaceæ* the septa are only distinguishable at the base of the ovarian cavity in the young stage, and this placentation, like that of the primrose family, has been described as free central.

Plagioclase, the collective name for those varieties of felspar that crystallise in the Anorthic

system, including microcline, a potash felspar, albite, or soda felspar, anorthite, or lime felspar, and the intermediate forms oligoclase, or soda-lime felspar, andesine, or soda and lime felspar, and labradorite, or lime-soda felspar, which Tschermak regards as only isomorphous twin combinations of albite and anorthite.

Plague, a contagious disease accompanied by fever and the formation of buboes or glandular swellings. It has been supposed that bubonic plague is of Oriental origin and this is doubtless true. The first European visitation of the pestilence on a great scale seems to have taken place in the 6th century, when it decimated the Roman empire. Another terribly fatal epidemic ravaged every country of Europe in the 14th century, its memories long surviving in England under the name of the Black Death. Plague has not visited the British Isles in epidemic form since the time of the Great Plague of 1665, of which Daniel Defoe wrote so realistic an account. It has prevailed, however, from time to time in Egypt and Asia Minor, and has been met with occasionally in Russia. India suffered severely from bubonic plague in the closing years of the 19th century and isolated cases broke out even as far West as Glasgow (1901). The plague is found in densely-populated communities living in defiance of the most rudimentary laws of health, without adequate supplies of wholesome drinking water and dwelling in filthy surroundings. Intelligent but stringent regard for public sanitation may be relied upon to keep it well under control if not to stamp it out altogether. The disease is an eminently fatal one, and bears considerable analogy to the malady known as typhus fever, but does not present the characteristic rash of that disease.

Plaice (*Pleuronectes platessa*), a flat fish allied to the flounder, frequenting sandy and muddy banks off the northern coasts of Europe, often passing into brackish and even fresh water. The upper side is olive, spotted with orange; the under-surface whitish; but the general hue of the fish



PLAICE.

(*Pleuronectes platessa*.)

harmonises with that of the ground on which for the time it rests. Buried all but the eyes in sand or mud, it lies in wait for its prey—principally molluscs. Trawl-nets and lines are used for plaice, and the flesh is valued for the table. The average length is about a foot, with a weight of three pounds, but specimens fifteen pounds in weight and

two feet long have been recorded. It is said that fishermen can tell from the fish's appearance in what locality it was taken. On the flat sands of the Solway the men and their families wade into the water with bare feet and when they tread on a fish they hold it down until it is secured by hand and transferred to their basket. Where the water is clear and the bottom rocky, the fish are sometimes caught by means of a spear to which a line is attached. But these are local and somewhat primitive methods. In East Friesland plaice are kept alive and in condition in freshwater ponds until required for the market. Plaice is considered to be at its best in May, but being the poor man's fish it is usually to be had all the year round.

Plain, a more or less extensive area of the earth's surface which is comparatively level though not actually or necessarily flat. In its widest sense a plain is a lowland as distinguished from a highland or mountainous tract. Plains are generally found in portions of islands and continents that were at one time under water. Accordingly they are frequently met with in coastal land running into the interior in the form of broad valleys. Much of Central Europe from the Rhine to Siberia is a vast plain interrupted only by the Ural mountains. Great tracts of North and South America, Africa and Australia are of the nature of plains. Their character, though not their name, is everywhere the same. In North-Western and Mid Europe they are heaths, in Hungary pusztas, in Russia and Western Asia steppes, in the Arctic circle in Russia and Siberia tundras, in Africa and Eastern Asia deserts, in North America prairies, parks and basins, in South America savannahs, pampas and llanos. Though attempts have been made to show that, geographically and climatologically, a prairie is different from a plain, this is true only in a narrow and unimportant way. Broadly, and one might almost say obviously, both are alike. There is a greater difference between an African desert and an American savannah, though even here both are nevertheless plains.

Plain Song, the old simple Church method of chanting, probably in unison and without harmony. The age of its introduction is uncertain, but it dates very far back, and the old notation does not throw very much light upon its nature. Ambrose, Bishop of Milan, in the latter part of the 4th century, and Pope Gregory the Great, towards the close of the 6th century, introduced conspicuous changes, almost amounting to a new method.

Plaintiff, in law, the person who begins a suit to recover a claim against another person known as the defendant. If he fail to make out a legal case, he may be non-suited, a judgment, however, which does not exclude a fresh action on the same matter should new evidence come to light.

Planarians, a class of worms known as the Turbellaria. They are, as a rule, fairly small, and always consist of only a single segment. The skin or ectoderm is covered with the small vibratile processes known as cilia. The nerves consist of a pair of long cords passing back through the body

from a pair of masses or ganglia at the front end of the body; in one group, the Acoela, the nerves are usually absent. There is a mouth, but no anus. They are nearly always hermaphrodite, but the male organs usually mature before the female. The class is separated into two divisions. The first, known as Rhabdocelida, are small, and the intestine is either lobed, straight, or absent; the second, or Dendrocelida, have a greatly-branched intestine, and are large in size. The Planarians are carnivorous, and a few are parasitic, such as Anoploium on the Sea-cucumbers. They live either in the sea, e.g., all the Polycladida and Acoela, or in fresh water, such as Plagiostoma, Planaria, etc., or on damp earth, such as the land Planarians, e.g., Bipalium. As they are soft-bodied, no fossil representatives are known.

Planché, JAMES ROBINSON, antiquary and dramatist, was born in London on February 27th, 1796. His father was a watchmaker of Huguenot descent. As a young man Planché developed a great taste for the stage both as actor and playwright. When Charles Kemble revived *King John* at Drury Lane in 1823, Planché dressed the play in the costumes of the period, the first time this had ever been attempted with real approach to historical accuracy. He wrote for the leading managers of the day and his industry was unceasing. Among the actors whom he supplied with dramas, farces and burlesques during many years were Madame Vestris at the (old) Olympic, Covent Garden and the Lyceum, and Benjamin Webster at the Haymarket; while he wrote a series of Christmas and Easter pieces, beginning with *The Fair One with the Golden Locks* for Priscilla Horton (afterwards Mrs. German Reed). An unauthorised production of his *Charles XII.* (1828) brought out at Edinburgh led to the appointment of a parliamentary committee of inquiry which ended in securing protection to dramatists (1833). Concurrently with his busy theatrical career, Planché became favourably known as an antiquary. His *History of British Costumes*, embodying ten years' research, appeared in 1834. Twenty years later he was appointed Rouge Croix pursuivant of arms at Herald's College in London and was promoted Somerset Herald in 1866. He superintended the disposition of the Meyrick armour at Manchester (1857) and South Kensington (1868) and the armoury in London Tower. He died at Chelsea on May 30th, 1880.

Planchette, a small thin triangular or heart-shaped wooden board mounted on three legs, two of which, inserted or glued on at the angles of the base, move on castors, while the third, inserted at the apex, carries a pencil. When the finger tips of one person, or two, are lightly placed on the board, more likely than not it will move about without conscious assistance from the operators. In the course of these movements the pencil-leg will trace marks on the sheet of paper upon which the planchette has been stationed. The machine, invented about 1855, is sometimes used at their *séances* by spiritualists, who claim that it may be made to write words and sentences, and thus,

through the medium, be the means of communication with the spirit world. This claim has never been adequately investigated and is, *prima facie*, fantastic.

Plane, in geometry. From experience we get the idea of a plane as a flat surface which can be extended to infinity in all directions. If we take any two points and pass a plane through them, we can turn this plane about the line joining the two points till it passes through another point. The plane is now fixed; hence, through any three points in space, one, and only one, plane can be drawn. Euclid defines a plane as that in which any two points being taken, the straight line joining them lies wholly in that plane. This is the same as saying that it has no curvature. It is, therefore, the limiting case of a sphere when the radius has become infinite. Two planes intersect in a straight line, and their inclination to each other is measured by the angle between two lines—one in each plane—drawn perpendicular to the line of intersection. When the planes are perpendicular to each other, this angle is a right angle. Any plane divides the whole of space into two parts.

Plane (*Platanus*), the sole genus in the somewhat isolated order of Incompletae, the Platanaceae,



PLANE TREE, CHEAPSIDE.
(Photo : Pictorial Agency.)

comprising five or six closely-allied species, trees native to the extra-tropical regions of the northern hemisphere. They throw off their outer bark in

squarish scales; and their large leaves, which are scattered, stipulate, stalked, and palmately-lobed, have a polished upper surface. These characteristics render them specially suitable for growth in the soot-laden atmosphere of large towns, and it is for this reason that they flourish in London where other trees would decline and die. The tree at the corner of Wood Street, Cheapside, is of historic and literary interest. It stands on the site of the church of St. Peter in Chepe, which was destroyed in the Great Fire in 1666. Possibly it was the sight of this tree, which he must frequently have noticed, that to some extent inspired Wordsworth when he wrote his characteristic little poem of "Poor Susan's Reverie." The axillary buds are concealed within the dilated base of the leaf-stalk. The flowers are monocious and hang in separate globular catkins, whence the trees derive their American name of Button-woods. The female flower may have from four to eight distinct carpels, each containing one or two pendulous ovules, but forming a one-seeded achene. The timber is smooth-grained, prettily marked, white or dull red, and susceptible of a high polish. It is used in carpentry and cabinet-making; but the trees are chiefly valued for their shade. In Scotland the Great Maple or Sycamore, the white wood of which is largely used for small articles of turnery, is called Plane. It is distinguished by its smooth bark, opposite leaves, loose racemes of flowers, two-winged fruits, and unfigured wood. The Oriental Plane (*P. orientalis*), the Maltese or Maple-leaved Plane (*P. acerifolia*), and the Occidental Plane (*P. occidentalis*) seem little more than geographical races.

Planet ("a wanderer") is the name given to each of the bodies in the solar system, these bodies all moving in elliptical orbits with the sun in one focus. They received their name, on account of their motion, to distinguish them from the fixed stars. Although their movements can be so simply explained, they appear to be extremely irregular, and were a source of great difficulty to the ancient astronomers, who invented many theories to explain them. The planets, in the order of their distances from the sun, are Mercury, which is nearest, Venus, the Earth, Mars, Jupiter, Saturn, Uranus, and Neptune, the planetoids occurring between Mars and Jupiter. Mercury and Venus are known as inferior planets, the others—those which are farther from the sun than the Earth is—being called the superior planets. When a planet and the sun are on the same side of the Earth, the three being in the same straight line, the planet is said to be in conjunction—inferior or superior, according as the planet or sun is nearer the Earth. When planet and sun are on opposite sides of the Earth, the planet is in opposition. The time between two successive conjunctions or oppositions is called the synodic period of the planet, and this is useful in calculating the relative distance of Earth and planet from the sun, and in determining the planet's periodic time. The orbits of all the planets (except the planetoid Pallas) are very nearly in the plane of the ecliptic, the intersections of the plane of the planet's orbit with the ecliptic being called nodes.

When an inferior planet is near one of these nodes at inferior conjunction, it looks like a dark spot on the sun's surface. This and other appearances show that the inferior planets are not self-luminous, but receive their light from the sun. Viewed through a powerful telescope, they are seen to exhibit phases similar to those of the moon, being sometimes crescent-shape (near inferior conjunction), sometimes halved, sometimes gibbous, and, at superior conjunction, exhibiting a full bright disc. The superior planets appear practically with a full bright disc, Mars alone being somewhat

LIST OF PLANETS, THEIR SYMBOLS AND
DISTANCES FROM THE SUN.

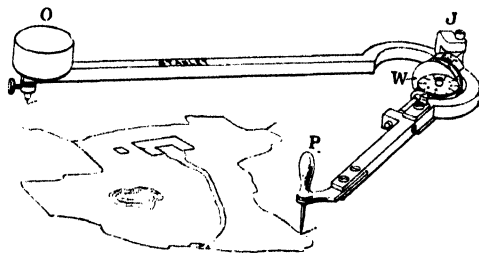
PLANET.	SYMBOL.	MEAN DISTANCE FROM THE SUN IN MILES.
Mercury	☿	35,392,000
Venus	♀	66,134,000
Earth	♁	91,430,000
Mars	♂	139,311,000
Planetoids	①, ②, to etc.	200,000,000 to 360,000,000
Jupiter	♃	475,032,000
Saturn	♄	872,137,000
Uranus	♅	1,753,869,000
Neptune	♆	2,745,968,000
Sun	☉	
Moon	☾	

gibbous at part of his course. The planets always appear, when seen, to shine with a steady light, thus differing from the twinkling stars; this gives a means of roughly distinguishing them in the sky. Several of the planets are accompanied by satellites or moons, these bodies revolving round the primary in the same way as the moon circles around the earth. Since the orbits of the planets are in most cases not far removed from the plane of the ecliptic, they are to be seen in a comparatively narrow belt of the heavens. The motions of the planets are in accordance with Kepler's Laws; hence, the interior planets take far less time to revolve round the sun than the exterior ones—the periodic time increasing the farther away the planet is from the sun. The motion of a planet is not strictly uniform; it moves faster when at perihelion than at aphelion, and those planets whose orbits are most eccentric (*i.e.*, differ most from circles) show the greatest difference between their quickest and slowest rates. Mercury, Venus, Earth, Mars, Jupiter, and Saturn were known to the ancients. Uranus was discovered by Sir William Herschel on March 13th, 1781, and Neptune (after its position had been theoretically determined by John Couch Adams and Leverrier) by Dr. Galle and Professor Challis in 1846. The planetoids (less accurately styled *asteroids*), already numbering more than 500, have all been discovered and named since January 1st, 1801.

Planetoids are the very small planets which have their orbits between those of Mars and Jupiter.

The greatest number has been found since 1845, owing doubtless to improved instruments and methods of search. The inclination of the orbits of these bodies to the plane of the ecliptic varies considerably, that of Pallas being as much as $34^{\circ} 42'$; and their eccentricities are much greater than those of the planets proper. Their motions among themselves are extremely irregular, the paths interlacing in a most intricate manner. Being so extremely small, it is almost impossible to ascertain their size; but it is believed that the largest is less than 450 miles across, while Leverrier considered that the sum of all their masses would be less than one-third that of the earth. The first five planetoids which were discovered were Ceres (1801), Pallas (1802), Juno (1804), Vesta (1807) and Astræa (1845).

Planimeter is an instrument by means of which the area within any closed curve can be practically measured. Several devices have been introduced for this purpose, one of the simplest being Amsler's planimeter. This consists of two arms, O J, J P, jointed at J and capable of moving quite freely in one plane. The end O of one arm is fixed, while the extremity P of the other arm can be made to move exactly over the curve whose area is required. The arm J P passes through the centre of a wheel W, and serves as its axis of rotation. The revolutions of the wheel measure the area traced out by the point P, and are independent of



the position of the wheel on its axis J P. However the tracing-point may move, its motion can be resolved into two components; one along the arm J P, and the other at right angles to it. It is obvious that the first will not cause the wheel to rotate; hence the wheel only records the motion which is perpendicular to its axis. After P has traced out the entire curve, the arms will obviously return again to their original position. It can then be mathematically proved that the area of the curve is equal to $J P \times s$ where s is the length recorded by the wheel.

Planisphere is a projection of a sphere on a plane. The name is practically applied to a device for ascertaining which stars will be visible on any given night. A chart of the heavens is fitted so that it can rotate under a cardboard cover, through a hole in which a portion of the chart can be seen. The days of the year are indicated by marks on the

edge of the chart, and by means of these the relative positions of it and its cover can be adjusted so that the stars which appear through the opening are those which will be visible on that night. Some stars—such as the Pole Star and the Constellation of the Great Bear—will always be visible, but those near the horizon will change from day to day.

Plankton, a term introduced by naturalists with special reference to aquarium work and marine laboratory research, to describe the floating organisms, whether plant or animal, that are carried about by ocean currents. Bacteria, diatoms and algae are examples of plant plankton, while medusæ, pelagic infusoria and small crustaceans furnish specimens of animal plankton.

Planorbis, one of the commonest genera of the family Lymnæidæ or Pond Snails. The shell consists of a flat, disc-shaped coil. The snail occurs in stagnant pools, ditches and quietly-running brooks, usually adhering to flags and other water-plants.

Plantagenet, the surname of the Anjevin kings of England. The first king of the name was Henry II., and the last Richard III. The name arose through Fulk, the first Earl of Anjou, being scourged, in Jerusalem, with twigs of the broom which grew profusely there. He bore this as a penance, and called himself Plantagenet from the incident. His son Geoffrey married the Empress Matilda, the widowed daughter of Henry I., and their son ascended the English throne as Henry II. The golden broom (*planta genista*) is the emblem of the family.

Plantain (*Plantago*), a name given originally to various plants with broad leathery leaves. In England it applies to the species of the genus *Plantago*, common weeds. *P. major*, with ascending leaves, a plant of waste places and road-sides, produces long spikes of fruit, which, when unripe, are collected as food for cage-birds. *P. media*, with mealy, flatter leaves and violet bracts to its shorter flower spike, is even more troublesome as a weed on lawns, especially on limestone. *P. lanceolata* or ribwort (so named from its narrow leaves with prominent ribs), a meadow-plant, has short black-bracted spikes of flowers on long peduncles. *P. Coronopus*, which favours cliffs by the sea, is popularly known as "Star of the Earth" from its divided radiating leaves. In the tropics the name is applied to that race of the bananas which has a green stem without purple spots, and a yellow angular fruit only edible when cooked (*Musa paradisiaca*); but the plant is not a distinct species from *Musa sapientum*, the banana. It is sometimes called "Adam's apple," from the notion that it was the forbidden fruit of the garden of Eden: the specific name embodies this fancy. It forms the food of millions of tropical peoples. Though less nutritious than wheat or potatoes, it is much more prolific and is grown with much less labour.

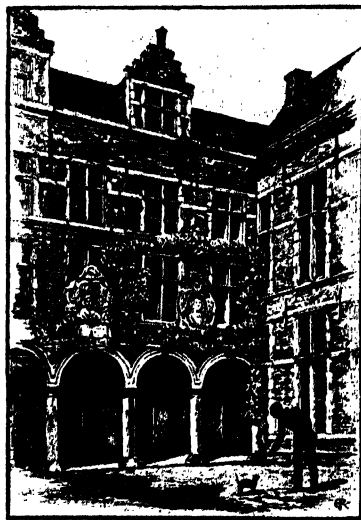
Plantation, in a specialised sense, referred to the settling of a country, either with a view to

establish a colony or in order to modify and counteract the designs of people already in possession. The encouragement of emigration from an old to a new country is a familiar example of the former policy; the plantation of Ulster by James VI. with Scottish colonists, largely in order to temper the predominance of the Roman Catholics, of the latter policy. The term was also applied to those large areas of tropical and sub-tropical countries, as the southern parts of the United States, the West Indies and South America, where cotton, tobacco and sugar-cane were cultivated by forced labour. It was once not unusual to deport and even to kidnap men to work in these plantations. In the reign of Charles II. the supervision of the colonies or plantations was entrusted to a committee of the Privy Council, which was called the Council of Plantations and was afterwards merged in the Board of Trade.

Planté Cell. [CELL.]

Plantigrada. [CARNIVORA.]

Plantin, CHRISTOPHE, printer, was born at Saint Avertin, near Tours, France, about 1514. He began as a bookbinder in Paris, Caen and Lyons, but settled in Antwerp as a printer in 1555. His press speedily acquired a wide reputation for the beauty of its typography, one of his most famous productions being the *Biblia Polyglotta*, which was intended to fix the Scripture text on a scientific basis and which was finished in 1573, after five years' unremitting toil. The Spaniards destroying great part of Antwerp (1576), Plantin set up a branch of his business in Paris and, later (1583),



PLANTIN MUSEUM, ANTWERP: THE COURTYARD.

another in Leyden as typographer to the university. But he returned to Antwerp when affairs were more settled and died there on July 1st, 1589. His

business was carried on by his son-in-law, John Moretus, whose descendants maintained it until 1876, when the city of Antwerp acquired the house and all its fittings for £60,000 and converted it, just as it stood, into the Plantin Museum. It is a perfect example of a mansion in the 16th-century Gothic, and one of the most charming buildings of a town by no means deficient in picturesqueness. Plantin's mark was a hand holding an open compass, with the motto *Labore et Constantia*.

Plant-Lice. [APHIDES.]

Plant Lore, though in no sense a scientific pursuit, is intimately concerned with human interests. In prehistoric times and even at much later epochs tree-worship was very general. Mythology recites numerous examples of men and women whom considerate Fate turned into flowers and trees, while the woods were presided over by dryad nymphs. Amongst the ancient Greeks a crown of laurel or of olive evoked as keen a zest for victory as the richly-endowed Derby or the Grand Prix amongst modern sportsmen. The language of flowers signifies much or little according to sex and circumstance, and carries as much authority as palmistry or graphology. In respect of weather the habits of plants have been closely studied and afford a rough and ready means of prognostication which, however, is only empirical at the best. The countryman who sees over and over again that when the pink-eyed pimpernel closes its flower in the day rain follows, naturally accepts this as a sure and certain guide. The odour of flowers is more apparent just before a shower, when the air is moist, than at any other time. It is a reasonable deduction therefore that when the air is fragrant with perfume rain is at hand. A plentiful display of berries on the holly is held to be indicative of a severe Christmas. It is not always the case; there are exceptions to the rule even of plant lore. But we may be assured that rural observation had remarked the connection between the two things for many years before the generalisation passed current as weather wisdom. Virgil noted in the *Georgics* that a profuse show of almond blossom meant a good harvest, while if the leaves were manifestly in evidence the grain crops would be light. A hard winter was supposed to be predicted by an abundance of dog roses or whitethorn blossoms. Early bramble-bloom signified an early harvest. Then plant lore is also closely mixed up with folk lore. The elder, for instance, is in evil repute and the rowan in good. Nations and families have taken flowers, plants and trees as badges. The rose is associated with England, the broom with the Plantagenets, the violet with Napoleon, the primrose with Lord Beaconsfield, the lily with France, the bluebell and thistle with Scotland, the shamrock with Ireland, the maple with Canada, the fern with New Zealand, the leek with Wales, the lotus with Egypt, the blue gum with Australia, and the disa with the Cape. It is, of course, impossible to know, but probably a majority of brides would dispense with the happiness of sunshine rather than abandon orange blossom.

Plants have been defined as living beings with a material organisation not animal in its nature. In their higher developments it is easy to distinguish the plant from the animal, but tracing both back to the primordial cell differentiation would be impossible. It has been said that plants are fixed, while animals move; but the exceptions forbid this distinction. The circumstance that most animals—but it is a vitiating "most"—feed on the products of previous organisation and plants are able to assimilate mineral matter, liquids and gases directly, has seemed to some observers sufficiently distinctive. Still the habits of insectivorous and parasitic plants show that even such considerations are not of universal application. The function of the plant in the scheme of Nature would thus seem to mediate between the mineral and animal world. The interdependence of the animal and vegetable kingdoms, however, is of the closest; it is a matter of life or death to both. Plants have a geological history and a geographical distribution; they pass through the stages of growth, maturity and decay; and economically they are of final value and importance to the human race. Scientifically, the vegetable kingdom has been the subject of systematic classification and exhaustive study, but of all the great men who have devoted themselves to its investigation the foremost place is, by universal consent, assigned to the illustrious Linnaeus.

Planula, a free-swimming embryo which is rather characteristic of the Cœlenterata. It differs from a blastula mainly by being ciliated. It becomes fixed, loses its cilia, and develops into the "hydranth" or polype tube of the adult form.

Plasmodia are irregular, formless aggregations of protoplasm, which occur among many of the simpler Protozoa. The most typical examples, however, are met with among some low organisms which are generally regarded as plants, such as the "Fission-Fungi" or Myxomycetes and the bacteria of malarial fevers.

Plassey, the scene of Lord Clive's famous victory over Suraj ud Dowlah, on June 23rd, 1757, on the Bhagirathi, Nadiya district, Bengal, 96 miles N. of Calcutta. The battle was fought on the left bank of the river which is said to have since consumed almost the entire field. Clive's mango grove was represented by three thousand trees in 1801; a century later there was only a solitary survivor, which is held sacred by Mahomedans. The locality has partly lapsed into jungle, once the haunt of robbers who "worked" the stream in pursuit of their nefarious calling, and has partly been laid under cultivation.

Plaster of Paris, a cement obtained by heating gypsum for some time to about 120°C. It consists of anhydrous sulphate of calcium CaSO_4 , and if mixed with water, sets to a hard mass owing to the combination of the two substances, heat being evolved by the action. As regards gypsum, the connection between it and beer does not seem too obvious. Nevertheless, at the annual meeting of the Institute of Mining Engineers of Great



POISONOUS PLANTS.—I.

1. WATER HEMLOCK (*Cicuta virosa*).

3. CYPRESS SPURGE (*Euphorbia Cyparissias*).

2. HEMLOCK (*Conium maculatum*).

4. AUTUMN CROCUS (*Colchicum autumnale*).

Britain (held in 1906), it was stated as incontestable that the pre-eminence of the beers of Burton-on-Trent was due to the fact that the breweries derived their water supplies from the gypsum deposits of the Dove Valley.

Plasticity is a property possessed by solids which are capable of being moulded. Thus lead can be moulded into bullets without being first melted, and it is to the plasticity of clay that the potter's art owes its origin and developments. To explain the motion and behaviour of glaciers, ice was assumed to have the property of plasticity. This view was first put forth by Bordier of Geneva in 1773, and, in 1841, Rendu, Bishop of Annecy, founded a theory of glaciers on the same basis. He pointed out the fact that many observations seemed to show that "glacier ice enjoys a kind of ductility which enables it to mould itself to its locality, to thin out, to swell, and to contract as if it were a soft paste." This theory of plasticity was later termed by James David Forbes the "viscous theory" of glacier motion. It has found many supporters, for ice has been shown in many cases to exhibit the property of plasticity in a striking manner. On the other hand, the ordinary experience of the extreme brittleness of ice has made it difficult for many to accept the idea.

Plastids, differentiated portions of the protoplasm in a cell. Like the nucleus, they are not formed *de novo*, but multiply by division. Though various in shape they seem uniformly to consist of a ground-substance of the proteid chloroplastin, with imbedded fibrils of the colourless proteid metaxin. The plastids themselves may be colourless (leucoplastids), green (chloroplastids or chlorophyll-granules), or otherwise coloured, generally red or yellow (chromoplastids); but under certain conditions these forms are interchangeable.

Plataea, a town in Boeotia, in ancient Greece, situated at the foot of the northern face of Mount Cithæron, 6 miles S. by W. of Thebes, from which it was divided by the river Asopus. Though the Thebans claimed to have founded it, the two communities were always at enmity. On the other hand, the Plataeans and Athenians were firm friends. They stood together at Marathon (490 B.C.) and Plataeans manned some of the Athenian vessels in the fight with the Persians off Artemisium (480). Plataea was the scene of the defeat of the Persian general Mardonius, who had been left in Greece with a large army by Xerxes, at the hands of Pausanias and Aristides in 479. The Plataeans, siding with Athens in the Peloponnesian War, underwent a two years' siege by the Thebans and Lacedæmonians in 428 and the following year. Their surrender was followed by a massacre and the destruction of the town, which did not recover its prosperity till after the battle of Cheronea (338). Alexander the Great helped to rebuild the walls of the town. With the decay of the old spirit of independence and the loss of Greek freedom, Plataea became of small account. Its people lived on their past and were deemed as braggarts by the other Boeotians.

Plate Glass. [GLASS; GLASSMAKING.]

Platinotype is one of the most simple, permanent, and beautiful of the processes used for printing photographic pictures from negatives. The paper employed consists of paper coated with a solution containing the bichloride of platinum, a platinous chloride, PtCl_4 , and ferric oxalate. It has to be kept carefully and perfectly dry, otherwise it deteriorates and becomes useless. When exposed to light under a negative, the ferric salt changes in those parts where the light acts, and a faint image is seen on the paper. By the depth of this image, the completion or sufficiency of the exposure may be estimated, or an instrument known as an actinometer may be employed for the purpose. The paper is then floated in a solution of potassium oxalate, when by the reaction of the ferrous and platinous salts, platinum is formed in the paper, and this constitutes the image. The paper is washed in dilute hydrochloric acid to get rid of the unchanged salts, and then in water to get rid of the acid. The prints thus secured are then dried, and form pictures in pure black-and-white with a matt—that is, not a glossy surface,—which appear to be absolutely permanent. By a slight variation of the process sepia tones may be obtained.

Platinum (chemical symbol, Pt; atomic weight, 194.3), a metal of comparative rarity, which occurs in nature in a free or uncombined state (usually in small metallic grains), in gold sands and alluvial deposits. The natural metal is, however, impure, containing also iron, palladium, and other rare metals of the same group of elements. It occurs chiefly in the Urals, California, Borneo, Brazil and Australia. The preparation of pure solid coherent platinum from the native metal is a matter of some difficulty owing to its great infusibility. It can, however, be melted by means of the oxyhydrogen flame. In the wet methods the native metal is subjected to the action of various solvents, and, by a complicated series of actions, platinum in the form of a black powder is obtained, which is afterwards welded or melted and cast in ingots. The melting is done in a lime crucible enclosed in a small lime furnace and heated by the oxyhydrogen flame. A dry method is also used in which an alloy of platinum and lead is first obtained, from which the platinum is obtained by cupellation, the alloy being strongly heated, so that the lead is oxidised and removed, the platinum remaining and being, as before, cast in ingots. It thus forms a silver white metal of very high density (specific gravity = 21.5). It is very malleable and ductile, while it can also support a great tensile stress. It is not acted upon by moist air, and does not oxidise. It is very infusible, and can be heated strongly in air without undergoing any alteration. It also withstands the action of most inorganic liquids, acids, etc. It is hence very useful for chemical apparatus which requires to be carried to a great heat or to contain corrosive liquids. In this way it is much employed for crucibles, evaporating basins, stills for concentrating sulphuric acid, and apparatus for hydrofluoric acid (which acts upon glass), etc. It possesses only a slight

expansibility by heat, and can be fused through glass without the latter cracking when cold, and is much used for this purpose. If alloyed with iridium the metal is still harder and less fusible. In a finely-divided state it forms a black powder known as platinum black, closely resembling lamp-black in appearance. This form of the metal possesses the remarkable power of absorbing certain gases—*e.g.*, oxygen, which it appears to condense within it. It may thus absorb 250 times its volume of oxygen. Probably owing to this is also due its property of effecting the union by mere contact of certain gases, oxygen and hydrogen uniting in the presence of platinum black. A form of platinum, also known as spongy platinum, is capable of inducing these catalytic syntheses. It forms a series of salts, the platinumous and platinic, as, *e.g.*, platinumous chloride, PtCl_2 , and platinic chloride, PtCl_4 . This last is the most important of its salts, and is largely employed in chemical laboratories.

Plato, the great Greek philosopher, was born at Athens in all probability, though it has been said Ægina was his birthplace, in 427 B.C. His father was Ariston, a descendant of Codrus, and his mother, Perictione, whose family claimed descent from Solon. He was named Aristocles, receiving the name of Plato later, probably from Socrates, in consequence of his broad brow or his fluency of speech; it is difficult to say which. In early life he began to write poems and to study philosophy. He burned his poems and became a disciple of Socrates at the age of twenty, and devoted himself most closely to that sage for ten years. He attended his trial, and after the drinking of the fatal cup (399) was obliged to betake himself to Megara, where he stayed with Euclid, who had formerly been one of Socrates' disciples. He then went to Cyrene, and studied geometry under Theodorus, and for some time travelled in Egypt and in southern Italy, where the Pythagoreans still retained some influence. On his return to Athens he taught philosophy in the grove of Academus, giving his services without fee or reward, and soon attracted a large concourse of pupils, among them being Aristotle and probably Demosthenes. At this time he had many famous contemporaries, among them Xenophon, Aristophanes, Thucydides, Euripides, Sophocles, and Praxiteles. In his fortieth year, according to somewhat doubtful testimony, he visited Sicily, where he incurred the anger of the tyrant Dionysius by the expression of political views obnoxious to that personage. He had a narrow escape from death, and was shipped as a slave to Ægina to be sold in its market-place. He was bought by a Cyrenaic philosopher named Anniceris, who set him at liberty, and he returned to Athens, and with the exception of two visits in later life to the younger Dionysius, stayed there during the remainder of his life. He never married, and took no part in public affairs of any kind. His grave and melancholy aspect gave rise to the saying, "As sad as Plato." He died in 347 at the age of eighty. For a long time his birthday was observed as a festival. His works have been handed down to us complete, and consist of dialogues, in which

form of literary composition he has been almost without an equal. Into these dialogues he has often introduced Socrates, and from them we get much of our information about that illustrious philosopher. According to some modern writers, Plato foreshadowed all modern philosophy, and it has been declared that all modern thought has been anticipated by him. Of his greatness there can be no doubt. He sought only truth and enunciated many noble doctrines. He founded no system, but his services to philosophy are not the less lasting. He divided it into its three parts, which he called dialectics, physics, and ethics, and in the first of these was a master. Dialectics, or the science of ideas, was his strong point. He held that not sensations, but ideas, determined our knowledge. The former merely inform us of the existence of things, but do not explain in the least. He urged this fact most strenuously, and directed it against the sophists, who, thinking man is merely a bundle of sensations, came to the conclusion that to let the senses have their full enjoyment was the chief end of man. Selfishness became in that way the greatest of all personal rights. Plato in his *Republic* combated this doctrine, holding that virtue was not an imaginary quality, but a reality. He is by no means so clear and cogent in his references to physics; but, after all, his ethical teaching is the most important. He taught the immortality of the soul, and said that the true philosopher should always be prepared for death, as that was not the end. He held that the soul was incarnate, and to the ancients the Socratic dialogue known as the *Phædo*, in which he insists upon its immortality, was the best of all his works. It is known that Cato read it just before depriving himself of life. Plato believed firmly in the value of analysis, of inquiry, of questioning the unknown, but he did not depend upon it absolutely. The genuine seeker after truth must have an inherent or intuitive reason, and must recognise those forces of Nature which are not entirely evident to the senses. The idea differs from the sensation in its being that which is, as opposed to that which merely seems. It will be seen that Plato begins with an assumption, and that no one will be convinced of the immortality of the soul who fails to perceive that it is a kind of instinct. Those who have died in the belief, however, as has been well said, had the instinct. Plato argues that nothing whatever can be thought or acted without some kind of assumption, and that this assumption necessarily lies at the root of all moral action. Plato's style is as fine as any in Greek literature, and though frequent attempts have been made to render his works into equally good English, they have hardly succeeded. Grote was one of the greatest of the expounders of Platonic philosophy, and among later scholars the name of Professor Jowett is entitled to prominent mention. His translation of the *Dialogues* is considered masterly. The first complete translation into English was that by Taylor and Sydenham, published in 1804.

Platoff, MATVEI [MATTHEW] IVANOVITCH, COUNT, general, was born at Azov, Russia, on August 17th, 1751. He joined the Cossacks of the

Don and achieved distinction in the campaign against Turkey in 1770-1. His prowess was further signalled in future wars and in 1801 he became chief of the Don Cossacks. He played a brilliant part in repelling the French invasion of his native land in 1812. It is asserted that he commanded twenty regiments of Cossacks, two of Chasseurs and two mounted batteries. He was the first to attack, the last to retreat. In rapid succession he encountered Jerome Bonaparte (the King of Westphalia), Beauharnais (at Borodino) and Davoust (near Polotsk), and overwhelmed the Grand Army near Kovno and at Vilna, where he captured enough men to make an army and enough *matériel* to equip it. He harried the retreating French with sleepless pertinacity, defeating Lefebvre at Altenburg (May 28th, 1813) and, after participating in the colossal struggle at Leipzig, obtained another victory at Laon in 1814. Count Platoff (the Tsar had ennobled him in 1812) died at his place near Novotcherkask on the 15th of January, 1818.

Platonic Love, a pure non-sensual affection between kindred spirits of opposite sexes. It regards the affinity of soul for soul, being concerned only with the mind and its excellences. Probably it is an echo at least of the teaching of Plato, who held that the family should be abolished and that the relations between the sexes should be controlled so as to prevent increase in the population, households being limited to a certain number.

Platt-Deutsch, or LOW GERMAN, a term applied to the dialects of the North German and neighbouring lowlands, but formerly extending from Holland to Russian Poland, and touching the borders of Denmark upon the north. The *Heliland* (a production of the 9th century) marks its first period, while the immediately succeeding period is poor in literature. *Reineke Fuchs* and the Flemish *Utenpiegel* may be classed as Platt-Deutsch. In the 16th century it was employed in history and theology. Klaus Groth (1819-99) and Fritz Reuter (1810-74) have given much impetus to the modern Low German.

Platte, a county in the north-western area of the state of Missouri, United States. It is bordered on the west and south by the Missouri and drained by the Platte. It occupies an area of 410 square miles. Coal occurs. The chief town is Platte City. Pop. (1900), 16,193.

Platte, a county in the east-central area of the state of Nebraska, United States. It is bounded on the south by the Platte and intersected by the Loup. It covers an area of 686 square miles. Pop. (1900), 17,747.

Platte, a river of the United States, formed by two head waters, the North and South Platte, both rising, though at different points, in the Colorado Rockies and uniting to make the main stream at the town of North Platte in Lincoln County, Nebraska. Its direction is mainly easterly through the vast treeless plains of Nebraska, and it enters the Missouri about 18 miles below Omaha, after a course of 450 miles (as

a combined stream) or 1,250 miles, following the North Platte, the longer of the forks. It is a broad, shallow stream, of inconsiderable volume compared with its length, dry in many parts during summer and not navigable.

Platycrinus, the type-genus of the Platycrinidae, an extinct family of Crinoids or Sea-lilies. Their remains are abundant in the limestones of the Carboniferous period.

Platyelmia, a group established for the "Flatworms" which belong to the three classes of the Turbellaria or Planarians, the Trematoda, and Tapeworms or Tæniada.

Platypus. [ORNITHORHYNCHUS.]

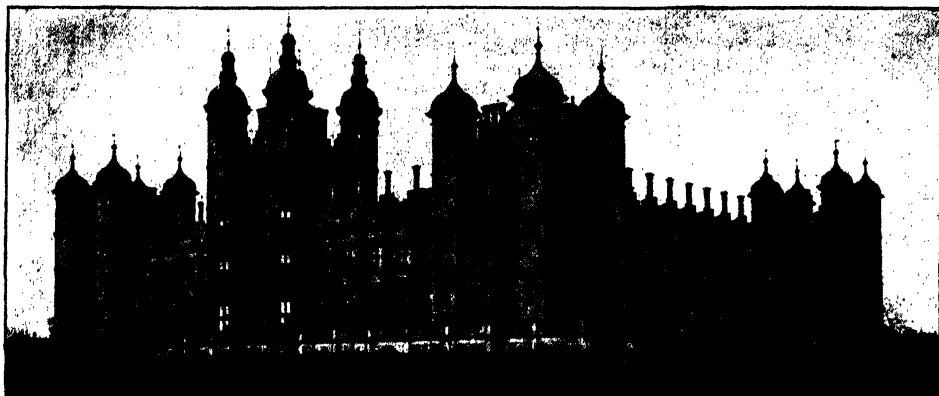
Plauen, a town of Saxony, Germany, on the Weisse Elster, 57 miles S. by W. of Leipzig. The most notable buildings are the Gothic church of St. John, the town-house, and the castle of Hradschin, now utilised as a law court. The leading industry is the manufacture of embroidery, lace and white cotton goods (introduced about 1570 by Suabian or Swiss immigrants), but dyeing, tanning, bleaching, machinery, paper-making and tobacco-making are also carried on. Probably of Slavonic origin Plauen afterwards became the capital of the Vogtland and was governed by Imperial bailiffs. It then passed to Bohemia (1327), but was acquired in 1466 by Saxony, to which it was finally annexed a century later. Though suffering many hardships during the Thirty Years' (ended 1648) and Seven Years' (ended 1763) Wars its prosperity has been constant. Pop. (1900), 73,890.

Plautus, TITUS MACCIUS, the most illustrious of Latin comic dramatists, was born about 254 B.C. at Sarsina in Umbria, Italy. Nothing is known of his early life except that he was of humble origin and went to Rome while still a youth. There he remained for some years in obscurity, occupying various menial positions. He became known to some of the Roman actors and began to write for the stage. He borrowed his plots from the Greek as a rule, but the exact extent of his obligations to them is not known, nor can it be discovered how he came to know Greek so well as he did. His plays were most successful and won the highest praise from his contemporaries. Cicero admired them greatly; and Horace's disparagement is the sole exception to the universal chorus of eulogy which the best of the plays received. He continued to write for the stage for forty years, producing such masterpieces as the *Aulularia*, *Menæchmi*, *Captivi*, *Miles Gloriosus*, *Trinummus*, and *Amphitruo*. Most of these have been copied or adapted by many modern writers, and even Shakespeare was indebted to him; but the French dramatists—and notably Molière, Regnard, and Destouches—were especially his debtors. Lessing declared the *Captivi* to be the best-constructed piece in existence. Of his hundred or hundred and thirty comedies only twenty have survived. They were first printed at Venice in 1472, and since that date have been reprinted and edited and translated into different languages numberless times. Plautus died, in 184 B.C. His

plays are vivid satires on the manners and follies of his time, and were very popular with the people of Rome.

Playfair, JOHN, mathematician and geologist, was born at Benvie, near Dundee, Scotland, on March 10th, 1748, and was educated at St. Andrews. Though he began his career in the Church, he was appointed, in 1785, joint Professor of Mathematics with Dr. Adam Ferguson in Edinburgh University, and in 1805 exchanged his chair for that of Natural Philosophy in the same institution. Concurrently with the discharge of his professional duties he worked zealously at geology and, in 1802, published his *Illustrations of the Huttonian Theory of the Earth*, a work whose lucid explanations and pure simple style were instrumental in popularising the science. After the close of the Napoleonic wars he made a long tour on the Continent studying the

1848 and took a prominent part in organising the Great International Exhibition of 1851 and promoting technical education. When the Department of Science and Art was formed he was made Secretary for Science (1853), and afterwards for both branches (1855). In 1858 he succeeded William Gregory in the chair of Chemistry in Edinburgh University, vacating it in 1869 in consequence of his election to the House of Commons as M.P. for Edinburgh and St. Andrews Universities. He was Postmaster-General in W. E. Gladstone's ministry in 1873, but went out of office with the Government in the following year. In 1880 he was appointed Chairman of Committees and Deputy Speaker. From 1885 to 1892 he represented South Leeds, being raised to the peerage in the latter year as Baron Playfair of St. Andrews. He died in London on May 29th, 1898. As a chemist he was too closely occupied with the practical application of scientific principles to have



DONALDSON'S HOSPITAL, EDINBURGH.
(Architect: William Henry Playfair.)

[Photo: Pictorial Agency.]

physical features of France, Switzerland and Italy. He died in Edinburgh on July 20th, 1819. He was one of the founders of the Royal Society of Edinburgh and was elected a Fellow of the Royal Society in 1807. His *Elements of Geometry* (1795) was a textbook for over a half a century.

Playfair, LYON, LORR, was born at Chunar, Bengal, on May 21st, 1818. After passing through St. Andrews University he studied medicine in Glasgow and Edinburgh, but was compelled to suspend his classes through failure of health. On his return from Calcutta, where he entered his father's business for a time, he became laboratory assistant to Professor Thomas Graham at University College, London, and also worked under Liebig at Giessen, where he graduated Ph.D. in 1840. Next year he was appointed chemical manager of Thomson's calico works at Primrose, near Clitheroe, in 1842 honorary Professor of Chemistry to the Royal Institution of Manchester, and in 1845 Professor of Chemistry to the School of Mines and Chemist to the Geological Survey. He was elected F.R.S. in

much time for original research, but his labours in connection with public health, the herring fisheries, the cattle plague, and civil service and educational reform were invaluable.

Playfair, WILLIAM HENRY, architect, was born in London in July, 1789, and studied architecture under William Starke of Glasgow. Through his uncle, Professor John Playfair, he was enabled to establish a good practice in Edinburgh and prepared the designs for Royal and Regent Terraces in the New Town. From 1817 to 1824 he was occupied in rebuilding the University, the front of which, however—the work of the brothers Adam—he preserved intact. Other buildings of his design in Edinburgh were the beautiful lodge and gateway for Heriot's Hospital, the Advocates' Library, the Royal Institution, the College of Surgeons, the Free Church College at the head, and the National Gallery at the foot, of the Mound. From 1842–8 he was engaged upon his masterpiece, Donaldson's Hospital, at the Haymarket, as to which the popular tradition is that Queen Victoria sighed for it in vain as a royal

palace. The monuments on Calton Hill to Professor Playfair and Professor Dugald Stewart—the latter an extremely graceful reproduction after the monument of Lysicrates at Athens—were also his designs. He died in Edinburgh on March 19th, 1857. It has been asserted that Playfair's numerous classical buildings helped to fix Edinburgh's *sobriquet* of "Modern Athens."

Plea and Pleading. A plea or pleading is a mode of putting forward a defence to certain proceedings. Pleadings in civil actions are now very much curtailed by the Judicature Acts; and by one of the orders made thereunder it is provided that "every pleading shall contain only a statement in a summary form of the material facts on which the party pleading relies, but not the evidence by which they are to be proved, and shall, when necessary, be divided into paragraphs numbered consecutively." Formerly pleas were of two classes. There were, in the first place, pleas of the Crown, or public prosecutions, usually in criminal cases, and, in the second, common pleas, which were civil suits between subjects or commoners. Barristers who laid themselves out to give expert opinions and especially to draw difficult pleadings and other documents were designated Special Pleaders.

Plebeians. [NOBILITY.]

Plebiscite, a word coined under the rule of Napoleon III. to denote the popular vote which confirmed him in the Empire and seemed at various times to show that his ascendancy was popular with the nation. The name is taken from the Roman *plebiscitum*, which was a decree of the plebs, that is, a law enacted in ancient times by the lower order of citizens assembled at a meeting called *comitia tributa* under the presidency of a tribune or other plebeian magistrate. At first such decisions affected only the plebs ("the common people"), but by a law of 449 B.C., ratified by later legislation, their scope was widened to include the patricians.

Pleopoda, the subphylum of Protozoa, including those which are provided with various forms of vibratile processes, whereby locomotion is effected and food obtained. These processes are either in the form of numerous minute hair-like structures or cilia, longer and coarser whip-like appendages or flagella, or as membranes. There are three classes—namely, Tentaculifera, Infusoria and Mastigophora, of which the second is the most important.

Pleiades, a group of stars occurring in that belt of the heavens called the zodiac, being those placed on the shoulder of Taurus. For the last weeks in May the Pleiades rise and set with the sun, so are invisible to us; but 2,000 years ago it was during the time corresponding to our April that they were not seen. After May the Pleiades rise every day earlier and earlier than the sun, till in August they have gained about 90°. During November they can be seen the whole night through, but after that the time during which they are visible gets less and less till May comes round again. Mythologically, the Pleiades were the seven daughters of Atlas and Pleione. Their names were Alcyone, Merope,

Celæno, Electra, Sterope, Taygeta and Maia. On their death Zeus placed them in the sky as a constellation. As six of them only were distinctly visible there arose a legend of a "lost Pleiad." Their rising was held to indicate the beginning of summer, their setting the beginning of autumn. Astronomers gave the daughters' names to the principal stars of the groups and added to these the names of the parents. As Sterope (or Asterope) is not very conspicuous she is regarded as the missing Pleiad, the *fons et origo* of the myth aforesaid.

Pleistocene System, the most recent of the geological systems, including what are known as Superficial Deposits, resting sometimes conformably on the Crag, but generally unconformably on strata of any age, and containing molluscs all of which belong to living species. Some geologists remove them from the Tertiary under the name Quaternary, mainly because in them alone are found remains of man and his works. Two series are commonly distinguished: the Lower or Glacial, containing many extinct mammals and others now living in distant regions [GLACIAL PERIOD; BOULDER-CLAY]; the Upper or Recent, containing few (if any) extinct mammals. Human remains or implements have been found in river-gravels, brick-earths, peat-mosses, lake-mud, cave-deposits, raised sea- and river-beaches, and shell-mounds or kitchen-middens, associated with the extinct mammoth, *Machærodus*, and the Irish deer (*Cervus Megaceros*). The gigantic Kangaroos (*Diprotodon*) of the Australian caves, and the sloths [*Megatherium*] and armadillos [*Glyptodon*] in the river-deposits of Argentina, are probably as recent as the beds containing human remains in Europe. [ANTIQUITY OF MAN.]

Plenipotentiary, a minister or diplomatist accredited to a foreign court, not personally representing the sovereign (as does an ambassador), but only the state which appoints him. He is furnished with full powers (as his name implies) to transact particular business. It may be said that every ambassador may be a plenipotentiary, but every plenipotentiary is not an ambassador. A plenipotentiary is not necessarily despatched to any specified court, and meetings of plenipotentiaries for the purpose of concluding peace, negotiating treaties, or carrying through other particular business are sometimes held in a neutral place with the express object of being free from influence of all kinds whatsoever.

Pleochroism, the variation in colour observed when some crystals are seen from different points; this is due to the fact that the rays which have varying vibrations in different planes suffer absorption in varying degrees.

Plesioporidae, a family of corals of much interest, since they are intermediate in character between the two great groups of the Fungida and the Perforata.

Plesiosaurus, a genus of the extinct reptilian group, the Plesiosauria, including numerous species, some of which reached a length of twenty feet. It

occurs from the Lower Lias to the Chalk; but allied forms are found in the Trias. The head was comparatively small, with one occipital condyle;



PLESIOSAURUS.

the nostrils were far back; it had slender, curved, sharp, striated teeth, in distinct sockets, unlike those of Ichthyosaurus; and it was without sclerotic plates round the eye. The neck was long and slender, and the tail proportionately short; but there were in some cases more than 90 vertebrae. The fore and hind limbs were very similar, longer than in Ichthyosaurus, but modified as swimming flippers. There were only five rows of digital phalanges. Dean Buckland likened the creature to a turtle with a snake drawn through it. It swam probably on the surface and fed like a swan, but in all likelihood on fishes and small reptiles. All its extremities were encased in flesh and skin like the paddles of cetacea. Though very perfect skeletons have been found in the Lias, there is no evidence of scales or scutes. The genus is represented in Britain, on the Continent, in India, Australia, and North and South America.

Plethora was the term applied by old medical writers to the condition in which they supposed there was an excess of blood in the body. The expression is still sometimes used to denote the habit of body in which there is a florid complexion with distended capillaries of the face, a tendency to hamorrhage, and it may be a disposition to over-indulgence in food and alcohol.

Pleurisy, inflammation affecting the pleura, the serous membrane covering the lungs and chest walls. The disease may be excited by exposure to cold, or arise from injury, or be associated with tubercular or malignant disease, or arise in the course of certain fevers or in association with kidney or heart mischief. The chief symptoms are pain in the side, aggravated on taking a deep

breath, fever, cough, and difficulty of breathing. Two varieties of pleurisy are described—dry pleurisy and pleurisy with effusion. In the former case the inflammation is accompanied by the formation of lymph, constituting what is called false membrane, and the rubbing of the diseased pleural surfaces against one another produces the characteristic "friction sound" which is heard in this condition on auscultation of the chest. In pleurisy with effusion, serous fluid is effused and accumulates in the pleural cavity, the underlying lung becomes compressed and collapsed, and on physical examination of the chest certain characteristic signs are discoverable. There is usually dullness on percussion up to the level at which the fluid stands, the breathing sounds are faint, and sometimes what is known as ægophony is heard by the auscultator when the patient speaks. When the effused fluid becomes purulent, the condition of empyema is said to exist. Treatment consists mainly in maintaining rest in bed and applying counter-irritation to the affected side. If the effusion develops to such an extent as to embarrass respiration it may be necessary to remove the fluid by the operation of paracentesis or tapping the pleural cavity. In the case of empyema this operation may also be sufficient; but it is usually found necessary to make what is called a free opening, with the object of draining the pus-containing cavity. It need only be added that both varieties of pleurisy are far too serious to be treated otherwise than by the medical man, who should be summoned without delay.

Pleurobrachia, a genus of Jellyfish belonging to the class Ctenophora and the type of the family Pleurobrachiadæ. The body is egg-shaped, about an inch in length, and, hanging from either side, just above the eye-spot, are two very long tentacles, like soft feather fringes on a spring, which may be either in rapid movement, coiling, undulating and actuating the tiny sphere in graceful curves, or may stream out listlessly, floating behind, twelve or eighteen inches long. In a moment they may contract and fold up into a knot no bigger than a pin's head. These tentacles constantly bring the minute prey—small immature marine animals and plants—within reach of the mouth. It is transparent and gelatinous. The genus is common in estuaries on the south and east coasts of England.

Pleurodynia, neuralgia affecting an intercostal nerve. It is a variety of muscular rheumatism, in which a sharp pain is felt in the side, greatly increased on movement, or by coughing, sneezing, or drawing a deep breath. On examination, a very tender spot will be found in one of the spaces between the ribs. The breathing is performed jerkily and with restraint, and the patient is apt to imagine that he is suffering from pleurisy or other severe affection of the lungs. However, no fever or serious symptoms set in and the doctor will probably speedily be able to reassure him. The affection usually originates in a violent cough or strain of the muscles or exposure to cold and damp. Rest in bed, or the fixing of the part artificially by means of straps of plaster, or warm

fomentations and a belladonna plaster will effect marked relief.

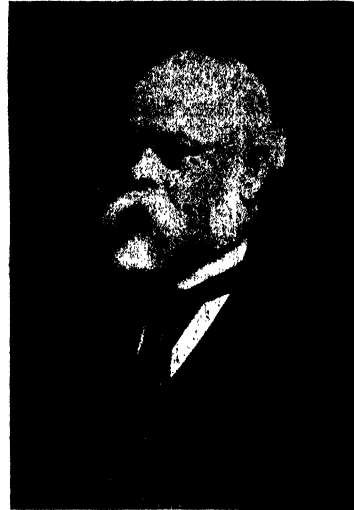
Pleuro-Pneumonia, a highly contagious malady which affects horned cattle. The chief symptoms are fever, with difficulty of breathing, accompanied by inflammatory mischief involving the lungs and their covering membrane. The disease may prove fatal in two or three days, but its course is usually more protracted. It is probably due to a micro-organism. Since 1890 the Board of Agriculture has been entrusted with full powers in respect of pleuro-pneumonia in the United Kingdom under the Diseases of Animals Act of that year. Under its stringent administration the disease has practically been stamped out of Great Britain and Ireland.

Plevna, or PLEVEN, a town of Bulgaria, near the river Vid, 28 miles S.W. of Nicopolis on the Danube. It was taken by the Russians July 6th, 1877, but retaken a few days later by Osman Pasha and held by him until the 10th of December, when, in spite of a prolonged and heroic resistance, the Turks were obliged to capitulate, owing partly to starvation and the growing scarcity of ammunition and partly to the genius of General Todleben. The siege cost the Russians 40,000 men and the gallant defenders 30,000, and the Rumanian allies of the assailants also lost heavily. A large trade is carried on in cattle and wine, and the manufacture of safes is a leading industry. Pop. (1900), 18,709.

Plica Polonica, a disease of the hairy scalp met with in Poland, and said to be due to a fungus.

Plimsoll, SAMUEL, the "Seamen's Friend," was born at Bristol on February 10th, 1824. He was educated at Penrith and Sheffield, and was in early life a solicitor's clerk. He afterwards became clerk and subsequently manager of a brewery, on leaving which he started in business for himself as a coal merchant (1853). Being anxious to serve the seafaring classes, and having frequently observed that sailors' lives were jeopardised by ship-owners sending out rotten hulks, he was elected M.P. for Derby in 1868, in order to devote himself heart and soul to the cause of the sailor. He demanded a compulsory load-line amongst other measures of protection and reform. His attempts at legislation having been repeatedly thwarted he published *Our Seamen* (1872), which had the desired effect of attracting public attention and a Commission of inquiry was at once appointed. It did not recommend a fixed load-line, but Plimsoll persevered and in 1875 Government was obliged to bring in a Merchant Shipping Bill. This was so modified in committee that Disraeli (afterwards Earl of Beaconsfield) resolved to withdraw it, whereupon Plimsoll shook his fist in the Premier's face and a scene in the House followed. A week later Plimsoll apologised, but he had won the day, for the Merchant Shipping Act was passed in 1876. In 1880 he gave up his seat at Derby to Sir William Vernon Harcourt and, though he contested other towns, he was never again elected. His interest in seamen, however, continued unabated, and in 1890 he became President of the Sailors' and

Firemen's Union. He died at Folkestone on June 3rd, 1898. The mark required by statute to be painted on the outside of the hull of every British



SAMUEL PLIMSOLL.
(Photo: Russell & Co.)

vessel, to show the depth to which she might be loaded, immediately became known as the Plimsoll mark and this will perpetuate the memory of a zealous and unselfish philanthropist.

Pliny, THE ELDER (Caius Plinius Secundus), naturalist, was born at Novum Comum (Como), Italy, in A.D. 23, and was educated at Rome. When twenty-three years old he went to Germany as a soldier with L. Pomponius Secundus, and during that campaign began his career as a writer, one of his works being a history of the German wars. On his return to Rome he studied law and became an advocate. Previous to Nero's death (68) he was procurator of Spain, and by Vespasian was made commander of the fleet. In the year 72 he adopted his nephew, the Younger Pliny (Caius Cæcilius Secundus). His desire for knowledge of the wonders of Nature was so intense that he would undergo great privations and sufferings to learn the smallest fact. He began to write his greatest work, the *Naturalis Historia*, and devoted years to the collection of materials. He was a wonderfully industrious writer and an omnivorous reader, and most of his knowledge came from his close study of the ancient writers. In 79 occurred the devastation caused by the eruption of Vesuvius, which overwhelmed Pompeii and Herculaneum, and Pliny's curiosity and thirst for information cost him his life. Wishing to observe the phenomenon nearer, he went to Stabiae (Castellammare) and made as many notes as he could of the catastrophe, but was suffocated by the noxious vapours from the crater. This happened in the first year of Titus's reign.

Pliny's work is in thirty-seven books, and contains most minute and very interesting material about geography, natural history, astronomy, meteorology, mineralogy, botany, zoology, etc. There is much that is absurd and ridiculous as well as exceedingly valuable in his compilation, which is written in an admirable style. He derived most of his matter from about one hundred authors and two thousand volumes.

Pliny, THE YOUNGER (Caius Cæcilius Secundus) statesman and author, was born at Novum Comum (Como), in the north of Italy in A.D. 61. He took the name of Cæcilius from his father, who had married Plinia, the sister of Pliny the Elder, who adopted him as his heir. He received a liberal education and was trained by Quintilian as an advocate. Though popular as a pleader and a distinguished orator, he was disgusted at the abuses that had crept into legal practice and gave up his profession for a public career. He filled in succession the posts of augur and præfect of the treasury in the temple of Saturn, quæstor, prætor, tribune of the people and consul (100). From 103 to 105 he was Governor of Bithynia and Pontica, in Asia Minor, and during his absence he addressed several letters to the Emperor Trajan, some of which are of exceptional interest and importance, since he describes the progress of Christianity and the behaviour of the persons who had been affected by "the contagion of this superstition." The year of his death is unknown, but it is conjecturally placed at about 115. His most valuable productions are the *Epistolæ* or *Letters*, which are classics. They are couched in polished and graceful Latinity and are cherished for the light they throw on the social life of the upper classes, the observations of nature and the account of the eruption of Vesuvius of which he was an eye-witness.

Pliocene. [CRAG.]

Plombières, a watering-place in the department of Vosges, France, on the Augrogne, 15 miles S. of Epinal. It is famous for its twenty-six mineral springs, which were known to the Romans and were declared national property in 1811. They are adapted for a variety of ailments, such as dyspepsia, hypochondria, nervous complaints, rheumatism, gout, gravel, paralysis and female disorders. The people are engaged in art metal work, embroidery, and other æsthetic pursuits. Thrice burned down, five times flooded, thrice ravaged by plague, once shaken by earthquake, in spite of its depressing history, the town has always risen superior to its calamities. It has had a succession of distinguished visitors from the days of Montaigne and Voltaire and was especially affected by Napoleon III., who is said to have planned here, in an interview with Cavour (1858), the campaign against Austria and who gave the place its modern vogue. Pop. about 2,000, greatly increased during the season.

Plotinus, Neoplatonist philosopher, was born at Lycopolis (the modern Siut), in Egypt, in A.D. 205. His antecedents are unknown, as he would never name his parents, so impressed was he that he owed them nothing for bringing him into

the world, a circumstance which, from his standpoint, he deemed to be a cruelty. He went to Alexandria when twenty years old, and studied philosophy under famous masters. He accompanied the Emperor Gordian to Mesopotamia when he was approaching forty, intending to study the Persian and Indian doctrines; but the assassination of Gordian, who proposed to invade Persia, frustrated his desire, and he escaped to Antioch and thence to Rome, where he taught what is known as the Alexandrian philosophy, attracting many pupils, among them being Porphyry and Longinus. His system is the Neoplatonic and Eclectic, being a revival of Plato's, and teaches the cultivation of thought, the avoidance of selfish passions, and the seeking of truth above all. After his death in Lower Italy in 270, at the age of sixty-five, Porphyry collected his works. The last words of Plotinus were: "The divine in me is about to join that which is divine in the universe."

Plough, one of the best-known and universally used instruments of agriculture. Though much changed from its primitive formation, it still retains its original essential features. It appears to date from the first period at which man conceived the idea of utilising the services of another creature—whether human or not—to aid him in turning up the ground. The earliest form of plough seems to have been a forked bough, the short and sharpened end of which was drawn through the ground, while a kind of handle fixed in the rear enabled someone to guide it from behind. Such a plough was in use in ancient Egypt, and was early introduced into Greece, while the Romans were not slow to produce a much more elaborate contrivance. The Roman plough is very fully described by Virgil in his *Georgics*. The essentials of the plough are—(a) the beam to which the horse is fastened, and which is lengthened backwards into one handle, to which the other handle is attached at an angle, and fastened by one or more cross-pieces; (b) the coulter, a vertically-fixed blade which cleaves the earth in a perpendicular direction; (c) the share, which cleaves it in a horizontal direction; (d) the mould-board, which turns over the excavated soil. Few implements have undergone more improvements, some of which are the substitution of iron for wood and the addition of wheels for greater ease and uniformity of work. The huge prairie-farms of the United States have given an enormous impetus to the improvement of ploughs, and it is in that country that the greatest variety of such implements is to be found. One of the most useful of these varieties is the double gang-plough. In this there are two shares set parallel to each other, but one in rear of the other, so as to make two furrows, and each of these shares has a removable point, which can be changed when it wears down. To the front part of the beam is fixed a single wheel, which can be adjusted by an arc-shaped lever, so as to regulate the depth of the furrow. The application of steam-power to ploughing has made comparatively little progress, though it has been employed with advantage in cultivating the wild lands in the north of Scotland, on the huge farms of the United States

and Canada, and in other regions where ploughing on a large scale is needed. The most ordinary form of steam-plough is one which is worked by a stationary engine at one end of the line and a drum secured at the other end, the two working an anchored cable and the plough, which turns several furrows, passing to and fro from one to the other, the points of *appui* (or support) being shifted as the work proceeds. The plough itself forms an obtuse angle, the exterior sides of which are provided with shares, and the one side is in the air while the other is at work. Each side of it is fitted with a seat and a steering-rod for the man who accompanies the plough.

Plough Monday, the first Monday after Twelfth Day. It was so called because it indicated that the Christmas holiday was ended and men had returned to their plough or other daily darg, or work. The sense of festivity was still strong, however, and they were allowed by custom practically to "make another day of it." Getting themselves up usually in white clothes and gaudily bedecked with flowers, feathers and ribbons, the labourers dragged the plough from door to door, soliciting "plough money" to defray the cost of the feast and frolic that closed the day's doings. Women were not quite so fortunate, since they were required to resume work on the 7th of January, which was on this account sometimes styled St. Distaff's Day and Rock Day (a rock being another name for a distaff). But they were expected to participate in the merriment at night, the woman who was chosen as queen of the feast being christened Bessy.

Plover, a general name for birds of the family Charadriide, very widely distributed. They frequent the shores or marshy grounds near water, and feed on molluscs, worms, and insects; but many of them retire inland to breed. The bill is stout, moderately long, with the nostrils at the base. The legs are long and slender, the toes are united by a small membrane, the hinder toe is small and elevated or absent, the wings are pointed, and the secondaries long. Very many of them are valued for the table, so highly, indeed, that the old proverb "A grey plover cannot please him" suggested a person who was excessively discontented. Their eggs are considered delicacies, though it has been broadly hinted that persons paying sixpence apiece for them, or even more, do not always purchase the eggs of the Lapwing. The Golden or Yellow Plover (*Charadrius pluvialis*) visits Great Britain in its summer migration and breeds in the northern parts, especially in the Highlands and Western Islands of Scotland. The average length is about 10 inches. The plumage of the upper surface in the adult male is black spotted with yellow and white. In the breeding season the under parts are black, becoming whitish in winter. The nest is a mere hollow in the ground, lined with dry grass; the eggs are four in number, pear-shaped, greenish-yellow in colour, with dark blotches and markings. These birds show great care for their young and often feign lameness to draw intruders away from their nests. This habit

is well-marked in the Lapwing, which is sometimes known as the Green Plover and also, from its wailing cry, as the Peewit. The Kentish Plover (*Egialitis cantiana*), first taken in 1787 at Sandwich, breeds freely in Romney Marsh, and Yarell says that dogs are trained to find the eggs. According to a Lancashire superstition, Plovers are regarded as birds of evil omen. The folk firmly believed that a person who startled a covey on the moors and was greeted with the plaintive cry of the "wandering Jews," as they were called, was likely to be overtaken with ill-luck. The Elizabethan poets looked upon them as emblems of solitude and desolation.

Plum (*Prunus domestica*), a small fruit-tree belonging to the sub-order Drupaceæ, of the Rosaceæ, native to Asia Minor and the Caucasus, and naturalised in most temperate parts of Europe. In cultivation its branches are generally spineless; its leaves are scattered, stipulate, convolute, simple ovate and deciduous; its flowers are white; its fruit is variable in form, size and colour, but uniformly glaucous, and with a compressed, pointed stone with a furrow along the edge. It was cultivated by the Neolithic dwellers in Swiss lake-dwellings. The Damson or Damascus variety was grown by the Romans from very early times; the Orleans plum is said to have been brought to England in the time of Henry V.; and the Greengage is believed to have been so named in compliment to Sir William Gage, of an old Sussex family, who introduced it into England about 1725 from France, where it is known as Reine Claude, from the wife of Francis I. Besides large quantities of many varieties, both home- and foreign-grown, which are eaten raw, in tarts, and in preserves, considerable quantities of dried plums, known as prunes, or, when small, as prunelloes, are imported into the United Kingdom and other countries. Among these are the Elvas from Portugal, the Carlsbad, the St. Julien (used especially medicinally as a mild laxative), and the St. Catherine from Tours. Bordeaux is the centre of the prune-packing and exporting trade; but large quantities are sun-dried in Bosnia. The spirit known as raki is distilled from the fermented juice.

Plumbago. [CARBON.]

Plumbic, salts of lead, which may be regarded as derived from the oxide PbO, by replacement of the oxygen by equivalent elements or groups—e.g., Pb(NO₃)₂, PbCl₂, PbSO₄, plumbic, nitrate chloride, and sulphate respectively.

Plume-Birds. [LONG-BILLED BIRDS OF PARADISE.]

Plume Moths, a section of Microlepidoptera in which each of the fore wings is usually cleft into two feathers and the hind wings into three; they belong to the family Pterophoridae. The English species which is largest and therefore best known is the White Plume Moth (*Pterophorus pentadactylus*, Linn.); it is common in gardens, expands rather more than an inch across the wings, and is a very delicately-formed insect, with long slender legs.

The insect known as the Twenty Plume Moth has each wing split into six feathers, which would seem to show that its popular title is a misnomer, seeing that the two fore wings and the two hind ones each contain six distinct feathers, or twenty-four plumes in all. It belongs to the family Alucitidæ, is a small brownish insect measuring three-quarters of an inch across the wings and frequents gardens, the caterpillar feeding in the buds of the honey-suckle.

Plumtree, EDWARD HAYES, divine and poet, was born in London on August 6th, 1821. He was educated privately and at University College, Oxford, and became a fellow of Brasenose in 1844. He resigned his fellowship three years later on his marriage with Harriet Theodosia, a sister of F. D. Maurice. He took holy orders and was appointed chaplain to King's College, London, in 1847, Professor of Pastoral Theology in the same institution (1853), and Professor of Exegesis (1861). He was rector of Pluckley in 1869, of Bickley in 1873, and became Dean of Wells in 1881. He took a keen interest in the higher education of women, and was Principal of Queen's College in Harley Street, London, for two years (1875-7). He died at Wells on February 1st, 1891. Among his theological works were *Christ and Christendom* (the Boyle Lectures for 1866), *Biblical Studies* (1870), *St. Paul in Asia* (1877), *Popular Exposition of the Epistles to the Seven Churches* (1877), *Movements in Religious Thought* (1879), *Theology and Life* (1884), *The Spirits in Prison, and Other Studies on Life after Death* (1884-5), besides commentaries in the *Cambridge Bible and The Speaker's Commentary*, contributions to Cassell's *Bible Educator* and his services as a member of the Old Testament Revision Committee. He was a poet of considerable distinction, his chief works in this kind being *Lazarus* (1864), *Master and Scholar* (1866), and *Things New and Old* (1884), in addition to several admired hymns. He also translated Sophocles (1865), Æschylus (1868), and Dante's *Divina Commedia* (1886-7).

Plumstead, a parish in North-west Kent, England, immediately adjoining Woolwich on the E., 10 miles E.S.E. of London Bridge. The Early English church of St. Nicholas, formerly the parish church, was once larger: the north aisle was rebuilt in 1820 and the interior restored in 1870. W. E. Gladstone delivered his last speech to his Greenwich constituents in a skating-rink here, which was prepared for the occasion. Some market gardening is carried on on Plumstead marshes where, too, several powder magazines are erected. In the chalk caves on Bostall Heath, in the vicinity, Dick Turpin is supposed to have had a hiding-place. Bostall Wood, purchased from Sir Julian Goldsmid, was opened to the people in 1893. About two miles to the east stand the few remains of the abbey of Lesnes or Lessness (the "Loisnes" of Domesday Book), a house of Augustinian canons founded in the 12th century by Richard de Lucy, Chief Justice of England, who relinquished his high dignities to become a canon and died in the house in 1170. The abbey was suppressed in 1520. The site of the church and cloisters is occupied by a market garden,

but the north wall of the refectory is partly extant. Pop. (1901), 68,327.

Plumulariids, a family of Hydroidea which is characterised by the possession of the structures known as nematophores. There are seventeen English species belonging to five genera. They are all marine and plant-like in form. The best known English genera are Plumularia, Aglaophenia, and Antennularia.

Plumule, the primary bud or rudimentary shoot in the embryo of a flowering plant.

Pluralism, a word used in the Church to signify the holding by one clergyman of two or more benefices. It was forbidden by canon law, but permitted by dispensation of Pope or bishops. Many Councils and Acts of Parliament have condemned the practice; and by 1 & 2 Vict. and 13 & 14 Vict., while vested interests were protected, it was enacted that no person should hold two benefices which were more than three miles apart, and in any case the annual value of one of them should not exceed £100, and that no two should be held one of which comprised more than 3,000 souls and the other 500. No person holding more than one benefice may hold a third, or any cathedral preferment. Other regulations were added by 18 & 19 Vict. Public opinion has steadily discountenanced ecclesiastical pluralism. In the State service when a Cabinet minister combines in his own person two offices, he either accepts half salary in respect of the less important or may elect to forego it altogether. Pluralism in the Law, by which is meant the acceptance by barristers of briefs for cases coming on in different Courts on the same day, to which they cannot possibly give personal attention, has often been regarded as something of a scandal, though since the time of hearing is probably unknown when the briefs are accepted it is difficult to see how the custom, unfortunate though it be, can be avoided, save by the return of those briefs which the advocate cannot himself carry through. Such a remedy would undoubtedly be popular with the junior bar.

Plush, a woven cloth resembling velvet, but having a longer nap. It varies both in texture and material, the latter being cotton, silk, wool, goat's hair, swan's down, etc., and the nap being either in warp or woof, either of these in such case being doubled. Plush for hats was first manufactured in Prussia, but in the 19th century the manufacture was introduced at Lyons, and France is now the chief seat of the manufacture. The warp is of silk, with cotton woof, and the nap is of dressed silk. Plush is widely used for upholstery, elaborate liveries, women's cloaks, men's silk hats, and (embroidered) for curtains and other materials for the decoration of rooms.

Plutarch, probably the most widely read of all Greek writers, was born in Chæronea in Bœotia, but his early life is very obscure, nor is the date of his death known for certain. In A.D. 66 he was a young man, and he is known to have survived till 120. During the reign of Domitian he visited Rome and lectured on philosophy, but it is curious that the Roman writers do not mention him. After

his sojourn in Rome he is supposed to have retired to his native place, and to have written some of his famous *Lives* there; certainly his *Life of Demosthenes* was composed in Cheronea. He became a priest of Apollo, married and had several children, and received several public appointments from Trajan. His writings consist chiefly of moral essays, apart from the biographies. The former are little read, the latter are universally known and admired. There are forty-six of them, entitled *Parallel Lives of Greek and Roman Writers*. He arranges them in couples, with a view to contrasting their qualities. He is not considered a first-class writer, his style lacking ease and finish; but it is needless to insist upon the great value of his writings to posterity. They have stood the test of many centuries of criticism, and not merely interest the scholar, but are a recreation for all desirous of knowing something of the lives of the great classics. His wonderfully vivid and genial portraits appeal to all classes of people. In his great work appear all the notable writers concerning whom he could glean any particulars. To his labours we owe in many cases most of our knowledge of certain of the ancients, and it is very peculiar, too, that from his pages we learn more about himself, perhaps, than from any other source. He is not unnaturally more partial to his own countrymen than to the Romans; but he seemed to be somewhat free from the narrowness which characterised other writers. He disliked the Epicureans, and was not at all favourable to the paradoxes of the Stoics. Socrates and Plato he deeply revered, and always celebrated their birthdays with due ceremony. That he made many blunders is true and scholars have at different times severely condemned them, but there is something pleasant, amiable, and courteous about his manner of telling his various stories. Moreover, the reading of his *Lives* inspired some of Shakespeare's greatest plays, as indeed much of the noblest literature of modern times, so that his occasional faults should be overlooked. He did not pretend to the microscopical treatment modern scholars have applied to the subjects he dealt with; he simply told what he knew of the men he described in the simplest and most direct manner. His love of wisdom and virtue are evident in his desire to bring out those qualities most prominently in his heroes. His work has been translated numberless times, the English version which is most generally known being that of the brothers William and John Langhorne, published in 1770. Though it cannot lay claim to any distinction it is a correct and faithful translation.

Plutens, the embryo of the sea-urchins and brittle-stars. It owes its name to the case-like arrangement of the calcareous rods which form the skeleton. These and the arms are absorbed during development and represent larval characters that have been acquired and are not vestiges of any former condition of the adult.

Pluto, the god of the dead in Greek mythology, was the son of Cronos and Rhea and brother of Zeus and Poseidon (Neptune). The three brothers having deposed their father, cast lots for heaven,

the sea, and the infernal regions, Pluto obtaining the last named and becoming lord of "the house of Hades," the domain of darkness. Pluto's other and more ancient name was Hades, which is thus seen to have possessed originally a personal sense, from which the notion of locality no doubt speedily followed. Ulysses in the *Odyssey* is represented as sailing towards a far western land, where he encounters Cimmerian gloom; and according to one Greek legend that was Hades. Another tradition places Hades on the verge of the ocean; but the common tradition locates Pluto's kingdom below, and the ground was tapped in invoking him. Hades was not a place of punishment, but simply the abode of death, of which Pluto was ruler, his wife being Proserpine. It is easy to understand how, in early times, places that gave off mephitic vapours—such as the Grotta del Cane near Naples—came to be regarded with superstitious dread as gates of the nether world.

Plymouth, a seaport on the English Channel, at the extreme south-west of Devonshire, England, 44 miles S.W. of Exeter. It is delightfully situated at the mouth of the Plym, which enters Plymouth Sound, the head waters of which consist of the estuaries of the Tamar, Tavy and Lynher, together forming the Hamoaze, which is continued into the Sound. At the east end is the natural harbour of Sutton Pool—Sutton (*i.e.*, South Town) being the oldest portion and the name of the place in Domesday Book, adjoining which, on the west, is the famous promontory of the Hoe (with the Citadel). Next comes Mill Bay, another natural harbour, while beyond, westwards, lie first Stonehouse and then Devonport which, with Plymouth, constitute the Three Towns, although to all intents and purposes they now make up one community. Half a mile from the Hoe is the Isle of St. Nicholas, popularly called Drake Island; while a mile and a half farther seawards is the immense breakwater, one mile long, extending across the middle of the Sound—built between 1812 and 1841 at a cost of about £1,750,000—which effectually screens the inner Sound from the gales of the Channel and thus affords ample and secure anchorage for the whole British Navy. From an early date the advantages of its situation were appreciated and by the time of Elizabeth Plymouth had assumed importance and was the favourite resort of Sir Humphrey Gilbert, Sir John Hawkins, Sir Francis Drake and other illustrious sailors of her period. The Armada moved majestically up Channel about noon on July 20th, 1588, shortly after Drake had finished the historical game of bowls on the Hoe, passing sufficiently near to the shore to enable the Duke of Medina Sidonia to admire the charms of Mount Edgecombe (on the west of the Sound) which, so the story goes, he earmarked as his English residence. In the Civil War the town rendered yeoman service to the Parliamentary cause and was also the first to declare for William III. in 1688. The principal buildings include the church of St. Andrew, a fine Perpendicular structure of the 15th century; the church of King Charles the Martyr, or Charles Church, in the Gothic (1646-7); the Roman Catholic

Cathedral of St. Mary and St. Boniface in Early English; the Guildhall, a handsome Gothic edifice; the Athenæum in the Classic; the Proprietary and Cottonian Library, containing a collection of pictures; the Free Library; the South Devon and East Cornwall Hospital, and the Marine Biological Laboratory. The Great Western Railway Docks in Mill Bay and the vast quayage on Sutton Pool accommodate the mercantile marine; while the Government Dockyard in Devonport with Keyham factory and the arsenal compose one of the most complete naval establishments in the world. The manufactures comprise chemicals, soap, starch,

Plymouth, capital of Plymouth county, Massachusetts, United States, on Plymouth Bay, 37 miles S.S.E. of Boston. As the landing-place of the Pilgrim Fathers on December 21st, 1620, it is the oldest town in New England, and one of the most famous spots in North America. The granite boulder on which the Pilgrims stepped ashore from the *Mayflower* is called Plymouth Rock or Forefathers' Rock, and is protected by a fine canopy. Pilgrim Hall, a granite structure erected in 1824-5 by the Pilgrim Society, contains a library and such relics as Miles Standish's sword. The National Pilgrim Monument comprises a colossal



THE HOE, PLYMOUTH.

[Phot.: Frith & Co., Reigate.]

candles, leather, rope, sailcloth, flour and biscuits, besides breweries, distilleries, extensive saw-mills, engineering works and ship-building yards. The import trade is very considerable and the exports include wool, China clay and tin and copper ore. Plymouth is a leading call-station for the outward- and homeward-bound liners of several routes. Among its natives were J. Northcote, B. R. Haydon, Sam Prout, and Sir Charles L. Eastlake, the painters, and Sir John Hawkins and his son, Sir Richard, both notable naval commanders. On the Hoe have been placed Sir J. E. Boehm's statue of Sir Francis Drake (1884), the Tercentenary Memorial of the Armada (1890), and John Smeaton's Eddystone Lighthouse (re-erected in 1882-4). Pop. (1901), 107,636.

figure of Faith holding a Bible in her right hand, the pedestal on which it stands being encircled by statues of Morality, Law, Education and Freedom. The manufactures include cottons, woollens, silks, machinery, nails and wire, besides iron-founding. Pop. (1900), 9,592.

Plymouth Brethren, a religious sect founded in England in 1830 by John Nelson Darby (1800-82). He was educated as a barrister, but soon withdrew from Law and, taking holy orders, became a curate in Wicklow. Doubts as to the Scriptural nature of established churches led him to resign his charge in 1827 and three years later the first assembly of the Brethren (sometimes called, quite unnecessarily, Darbyites) was held in Dublin.

Subsequently he lectured in many countries, his contention being that since the Church had lost touch with society, a voluntary association should be formed, the members of which should possess equal rights of addressing and exhorting one another, their services in this respect resembling those of the Society of Friends. Divisions afterwards arose, but congregations were established in Plymouth, London, Exeter and elsewhere, and acquired, somewhat unexpectedly, decided strength in the Protestant communities of Switzerland, Holland, France and Italy, as well as in the United States. The views of the sect, which professes no special creed, are not markedly different from those of Evangelical bodies adopting Calvinistic doctrines. The Lord's Supper is administered every week and infant baptism is an open question. They are entirely opposed however, to an official clergy or ministry, thus holding the Voluntary principle in its extremest form. Their theory is that every believer is, *ipso facto*, spiritually a priest. The body takes its name from the fact that meetings were established in Plymouth about the same time as that held in Dublin, and that members undertaking evangelistic work in the English provinces were usually introduced as "brethren from Plymouth," which came to be abbreviated into "Plymouth Brethren."

Pneumatic Despatch, the method by which documents, chiefly telegraphic messages, are transmitted through a tube by means of air-pressure. A railway on this principle was proposed, but the method was first put to practical use in 1853 by Latimer Clark. He brought the central station of the International Telegraph Company into connection with the London Stock Exchange by means of a tube 1½ inches in diameter and carriers, fitting piston-wise, were sucked through it in one direction only, the tube being joined to a vacuum holder. In 1858 Mr. C. F. Varley further developed the principle, using compressed air for the outward traffic and retaining the vacuum holder for the inward, so that a single radiating line of pipe could be used both for sending and receiving. This system has been brought to a high state of efficiency in the British Postal Telegraphic Department. Experience has shown that a lead pipe, 2½ inches in diameter, made air-tight by soldering the joints, enclosed in an iron pipe for protection, is the most convenient size, but 3-inch tubes are also used. The carriers which convey the documents consist of gutta-percha bodies covered with felt. The head is provided with a buffer or piston formed of several felt discs. The carrier is placed in the tube, the end of which has a double valve containing two sluices geared together, so that the single movement of a handle closes one and opens the other. It further opens a valve which admits air from the compressed air main behind the carrier. The arrival of the carrier is electrically signalled from the out-station, and the handle is then pushed back; this cuts off the compressed air, closes the upper sluice and opens the lower, the tube now being free to transmit the next carrier. The carrier is returned by making a connection at the central station with

the vacuum main instead of the pressure main. A rate of 25 to 35 miles an hour is attained in tubes a mile long, the speed varying inversely as the square root of the length of the tube. The British Postal Department possesses a total length of over 60 miles of tube laid underground, of which 40 miles were in use in London. Many large offices employ short tubes called "house tubes," which are worked either by power or by hand pumps. The tube from the Central Office in St. Martin's-le-Grand to the Houses of Parliament is 2,000 yards long. The pumps for the whole of the London system are worked by several 50 h.p. steam engines.

Pneumatic Gun, or AIR-GUN. The principle of the air-gun was known to the ancients, and for over two centuries has been familiar in France. Of the several forms in which such guns are made the most usual resembles a musket with lock, stock and barrel, the air chamber being placed above the barrel. The air is condensed by the use of a syringe in the stock. When the trigger is pulled a valve opens behind the bullet, which is projected by the compressed air with great force for a distance of from 60 to 80 yards. But the most powerful condensing syringe has only half the elastic force of gunpowder. Air-canes, having the appearance of thick walking-sticks, contain an air chamber in the handle which can be unscrewed. Several inventions have been patented for the purpose of adapting compressed air to guns. In 1867 Sir Henry Bessemer endeavoured to fire large shot with pieces of ordnance. Mr. Mefford, of Ohio, in 1883 succeeded in propelling a projectile 2,100 yards with air pressure by an ingeniously simple device; a hose with an ordinary cock admitting the air into the gun behind the projectile. This led Captain E. J. Zalinski, of the United States Artillery, to make further experiments, and in 1888 he invented a pneumatic gun for throwing highly explosive shells. Air at 1,000 lbs. pressure, supplied from reservoirs, is introduced into the gun behind the shell and this amount of pressure is capable of sending a shell of 100 lbs. 3,000 yards. Pneumatic guns have been mounted for the protection of New York and were also used in the Spanish-American war of 1898.

Pneumatics, that branch of physical science which treats of gaseous fluids. The name, however, is rapidly passing out of currency, the subject being now regarded as a branch of Hydrodynamics. It discusses the nature and properties of the atmosphere, gases, sound, waves and wind, and the scientific principles of such instruments as are employed in their investigation.

Pneumogastric Nerve. The pneumogastric or vagus nerve has a wider distribution than that of any other cranial nerve. It supplies branches to the pharynx, it gives off a superior laryngeal branch which is chiefly sensory in function, and the inferior or recurrent laryngeal nerve, which is the motor nerve of the larynx. It supplies the oesophagus, it gives off branches which enter largely into the supply of nerves to the heart and lungs, and its terminal branches ramify over the walls of the stomach. The vagus also communicates freely with neighbouring cranial nerves.

Pneumonia, inflammation of the lungs. This disease may be due to exposure to cold, or to extension of inflammation from the pleura without or from the bronchial tubes within. It is sometimes traceable to the inhalation of irritant particles, and occurs in connection with various fevers, and with heart or kidney disease. In some instances it appears that pneumonia is due to invading micro-organisms. Two chief varieties of pneumonia are described, viz., croupous or lobar pneumonia, in which an entire lobe of the lung may be involved, and catarrhal or lobular pneumonia, in which the disease is usually secondary to mischief affecting the smaller bronchi, and is of "patchy" distribution. In acute lobar pneumonia three stages of the disease are recognised. There is first the stage of hyperemia or engorgement, in which the affected portion of the lung is congested. Then follows the stage of red hepatisation, in which the lung becomes consolidated by the effusion of inflammatory material into the pulmonary alveoli. In the third stage the effused material becomes more fluid and purulent in character (grey hepatisation). Lobular pneumonia is usually met with in children, and is often associated with collapse of portions of the lungs. The chief symptoms of the disease are fever, difficulty of breathing, and cough often accompanied by a peculiar, slightly blood-stained, tenacious, "rusty" sputum. Pain, if present, is usually due to associated pleuritic mischief. On physical examination of the chest during the first stage of pneumonia, the phenomenon known as fine crepitation is observed; when the lung becomes consolidated, dullness on percussion is elicited, and bronchial breathing is heard over the affected area. Pneumonia often terminates by crisis, the temperature suddenly falling after the lapse of five, six, or more days. In rare instances abscess or gangrene of the lung occurs as a sequel to pneumonia. Treatment is that of fever with the administration of such remedies as may be deemed necessary to relieve the symptoms due to the lung mischief. Counter-irritation is sometimes employed, bleeding was at one time largely used, and the application of leeches to the affected side of the chest is still often prescribed. Painting the chest and back with antiphlogistine affords relief. The use of stimulants is called for in severe cases.

Po (the ancient *Padus* and *Eridanus*), the largest river of Italy, watering, with its tributaries, the whole plain of Piedmont and Lombardy. It rises near Monte Viso in the Cottian Alps, and, taking a north-easterly course as far as Turin, then turns due east, till it discharges itself by many mouths into the Adriatic, half-way between Venice and Ravenna. Its length is about 420 miles, and the area of its basin may be put at about 27,000 square miles. It is navigable for vessels of 15-feet draught as far as the junction of the Adda, and for smaller craft to Piacenza. In its lower reaches it has to be guarded by huge embankments, and it is liable to disastrous floods and rarer droughts. The Dora Riparia, Dora Baltea, Sesia, Ticino, Adda, Oglio and Mincio on the left, and the Maira, Tanaro,

Trebbia, Taro, Parma, Enza, Secchia and Panaro on the right, are its principal affluents.

Poaching, the popular term for the offence of unlawfully taking or destroying game, which is one against public order. By an Act of Parliament of Victoria's (1862) reign entitled "An Act for the Prevention of Poaching," power is given to any constable in any highway, etc., to search any person whom he may have good cause to suspect of coming from any land where he shall have been unlawfully in search of game, and having in his possession any game unlawfully obtained, or any gun, or net for taking game; and also to stop and search any cart, etc., in which such constable, etc., shall have good cause to suspect that any such game, etc., is being carried by any such person; and should there be found any game, etc., upon such person, cart, etc., to seize such game, etc., and such constable, etc., shall in such case apply to some justice for a summons, citing such person to appear before two justices, by whom the party may, on conviction, be fined any sum not exceeding £5, etc. An appeal against a summary conviction is given to the Quarter Sessions. The word "game" in this Act includes hares, pheasants and partridges, woodcocks, snipes, rabbits, grouse, black or moor game, and eggs of grouse, black or moor game. Besides the above enactments, there is still more stringent punishment awarded by earlier statutes for poaching by night. It is provided that if any person shall by night unlawfully take or destroy any game or rabbits in any land or on any public road, etc., or shall by night be in such places with any gun, net, engine, etc., for the purpose of taking game, he shall be liable to imprisonment for the first offence for any period not exceeding three months with hard labour, and at the expiration of such period to be bound over to his good behaviour by sureties for a year, or in default thereof to be further imprisoned for six months or until such sureties are found. For a second offence he is liable to imprisonment for six months, and then to be bound in sureties for two years, and in default thereof to be further imprisoned for one year or until such sureties are found; and if he offend a third time, he is guilty of a misdemeanour, and liable to penal servitude or imprisonment with hard labour for not more than two years. When any person is found committing such offence, the owner or occupier of the land, or any person having a right of sporting thereon, or the lord of the manor, or the gamekeeper may apprehend him; and if he assault the person apprehending him, he is guilty of a misdemeanour, and liable to penal servitude or imprisonment with hard labour for not more than two years; and where any persons to the number of three or more by night unlawfully enter lands for the purpose of taking or destroying any game or rabbits (any of them being armed with any gun or other offensive weapon) they are to be deemed guilty of a misdemeanour, and are liable to penal servitude for any term between seven and five years, or imprisonment with hard labour for not more than three years. The brutality of such enactments in many cases defeated their own end, juries often

finding it difficult, if not impossible, to convict. There is poaching in river or lake, and even in tidal waters, and this also is punishable by severe penalties.

Pocahontas was born about 1595, and was the daughter of an Indian chief, named Powhattan, who claimed to be the king of the Indian tribes extending from the seaboard of Virginia to the interior. When Captain John Smith, the coloniser of that state, was about to be slain by the savages she saved his life (1607), and later was able to warn him of an intended massacre of the English (1609). She fell in love with John Rolfe, one of the English colonists, and was married to him (1613), after which she came to England (1616) and was presented at Court. In March, 1617, she died at Gravesend at the early age of 22, just as she was embarking for Virginia, leaving a son, from whom the Virginian Rolfees are descended. Charles Deane, in a note to his edition of Captain John Smith's *True Relation* (1866), expresses some doubt as to the veracity of the captain, and since then the balance of expert opinion inclines to regard the pretty Pocahontas episode as belonging to the domain of fiction.

Pochard, a duck belonging to the marine genus *Fuligula*, in which there is a lobe on the hind toe. The Common Pochard (*F. ferina*), which visits Great Britain in winter, has the head chestnut-red, the throat black, and the body plumage grey. It sometimes breeds on inland lakes.

Pococke, EDWARD, Orientalist, was born at Oxford in 1604, and was educated at Thame and Magdalen Hall and Corpus Christi College, Oxford. He was ordained in 1629, but had already devoted himself to Oriental studies. In 1630 he published at Leyden the Syriac version of the New Testament, with the four missing Catholic epistles which he had discovered in MS in the Bodleian Library. In the same year he went as chaplain to the English Turkey Merchants at Aleppo, where he perfected his knowledge of Arabic. On his return to England, in 1636, he was appointed first incumbent of the chair of Arabic in Oxford University. From 1637 to 1640 he resided at Constantinople, continuing his researches and collecting MSS. When he came back to Oxford (1640) he found it much disturbed by the commotions of the Civil War, but he was presented to the living of Chikdrey in Berkshire. In 1648 he was made Professor of Hebrew, but was threatened with the loss of both chairs by the Visitation Commission empowered to investigate the affairs of the University, until the leading scholars of the day warned the Commission that it would cover itself with contempt if it dismissed "for ignorance and inefficiency" a man whose learning was the admiration of Europe. He published (dedicated to John Selden) his *Specimen Historiæ Arabum* (1649), a monument of erudition and scholarship, and in 1657 Dr. Brian Walton's *Biblia Sacra Polyglotta* appeared, in which for five years Pococke had manifested the most active interest. At the Restoration he became Canon of Christ Church, and also received the degree of D.D. His industry never weakened, although his anxieties

were now at an end. He published in 1660 an Arabic version of Grotius's *De Veritate Religionis Christianæ* and in 1663 the Arabic text and Latin translation of the *Historia compendiosa dynastiarum* of Abu-el-Faraj (Bar Hebræus). He also translated into Arabic the catechism and liturgy of the Church of England (1674) and afterwards issued commentaries on the Minor Prophets (1677-91). He died in Oxford on September 10th, 1691.

Pococke, RICHARD, traveller, was born at Southampton, England, in 1704, and was educated at Corpus Christi College, Oxford. He entered the Church and in 1725 became precentor of Lismore Cathedral. From 1733 to 1736 he travelled frequently in Europe and, in 1737, undertook an extensive tour in the East, visiting Egypt, the Holy Land, Syria, Greece, Italy and Switzerland. He explored the Mer de Glace in the Valley of Chamounix (1741) and may be regarded as the pioneer of Alpine travel. On his return to England he published in 1745, in two volumes, *A Description of the East and some other Countries*. In this year he was made Archdeacon of Dublin and in 1756 was appointed Bishop of Ossory. He took a great interest in developing Irish manufactures and in 1763 established the Lintown factory in Kilkenny for the instruction of boys in the art of weaving. Under the name of Pococke College this work is still carried on by the Incorporated Society for Promoting English Protestant Schools in Ireland, which benefited under his will. In July 1765 he was translated to Meath and died, in September of that year, at Charleville, near Tullamore. During the last twenty years of his life he made several systematic tours in England, Scotland and Ireland, but it was not until late in the 19th century that his descriptive accounts, illustrated by his own drawings, were published. But for this he and not Thomas Pennant would have had the credit of being the first methodically to explore some of the unknown regions of the British Isles.

Podargus, a genus of Goatsuckers with ten species, from Australia, Tasmania, and the Papuan Islands. They are nocturnal insect-eating birds, sometimes called "frog-mouths" from the width and breadth of their gape. There is no oil-gland, but the rump bears a powder-down patch on each side. *P. strigoides* is called by the colonists "More-pork," from its cry. It is wholly nocturnal in its habits, manifesting during the day a lethargy and craving for slumber that would almost have awakened the Fat Boy in *Pickwick* to envy. John Gould, the well-known ornithologist, says he found it nearly impossible to arouse it and often shot one without disturbing its mate, sitting beside it. It can be knocked off the branch with a stone or stick, or even taken by hand. If effectually disturbed, it will fly with heavy wings to a neighbouring tree and there resume its interrupted sleep. At nightfall, however, it becomes as animated and active as it had been dull and stupid by day.

Podiebrad, GEORGE OF, King of Bohemia, was born on April 6th, 1420. He was the son of a Bohemian noble, and entered the army at an early age, when

his gallantry speedily procured his promotion. In 1444 he became leader of the Calixtines or Utraquists, one of the most powerful parties in Bohemia. Being a Hussite, he was twice excommunicated by Pope Paul II. for contumacy. He became regent for the youthful King Ladislas, and on the latter's death was elected king (1458), in spite of the Papal wrath. He forced his enemies to come to terms with him, and gained many brilliant victories over the leagues organised against him. He died on March 22nd, 1471.

Podophthalmata, or STALK-EYED CRUSTACEA, are those in which the eye is situated at the end of a flexible peduncle or stalk. This is the case in the Stomatopoda or Locust-shrimps, the Schizopoda, as Mysis the Opossum-shrimp, and the Decapoda, including all the Lobsters and Crabs. These were therefore all once grouped together as the Podophthalmata, while the sessile-eyed members of the Malacostraca, or higher Crustacea, were united into the sub-class Edriophthalmata. As it is now believed that one order, the Cumacea, the members of which have sessile eyes, is more nearly allied to the stalk-eyed group, this classification has necessarily been abandoned. The Malacostraca are now therefore divided into three groups, the Leptostraca for Nebalia, the Arthrostraca, including the Amphipoda and Isopoda, and the Thoracostraca including all the Stalk-eyed Crustacea and the Cumacea.

Podophyllum, a genus of polypetalous plants placed by some botanists with the order Berberidæ, by others with the Ranunculacæ, and by a third with the Podophyllæ, created for its reception. Of the two species of which it consists one, the *Podophyllum peltatum*—the wild mandrake of North America, called also the May Apple from the early ripening of its fruit,—is a perennial, found in moist woods and by shady streams in the United States and Canada, and the other, *P. emodi*, occurs in the Himalaya. From the roots of both is derived a resin called Podophyllin which has active purgative properties and stimulates the secretion of bile. It is therefore largely used (generally in pill form, $\frac{1}{4}$ of a grain to a dose) by those who are averse from taking calomel and other mercurial preparations. On this account Podophyllin is frequently styled vegetable mercury.

Poe, EDGAR ALLAN, poet and novelist, was born at Boston, Massachusetts, on January 19th, 1809. He was the son of players connected with the Boston stage, who left him an orphan at an early age. He was then adopted by Mr. John Allan, a rich tobacco merchant of Virginia, whose wife, having no children, had taken a liking to him. He was a boy of great intelligence and made rapid strides in learning when sent to school, but was of a somewhat retiring disposition. In 1815 he was brought to England by his foster-parents (whose name he had added to his own) and was sent to a school in Stoke Newington, remaining there for five years. On his return to the United States he entered the University of Virginia (at Charlottesville) and matriculated there, but con-

tracted some bad habits and ran into debt through gaming. His foster-father took him into his business as a clerk, but Poe soon gave it up and went to Boston, where, in 1827, he published *Tamerlane and other Poems*, a volume of verse which was received with indifference. Having no money, he then entered the army and for a time his



EDGAR ALLAN POE.
(From an old engraving.)

conduct was so exemplary that Mr. Allan bought him a cadetship, which, however, he did not appreciate, acting, indeed, in such a manner as to get cashiered in 1831. Two years before this he had brought out a second edition of his poems, and in 1831 another volume of them was issued in New York and was also badly received. Going to Baltimore, he obtained some journalistic work through the influence of John Pitt Kennedy, the novelist and politician, and there edited a paper, for which he wrote some of his most marvellous stories. In 1836 he married his cousin and his prospects were very bright; but his waywardness was shown in 1837, when he resigned and went first to New York and then to Philadelphia, in which cities he became editor of several papers in succession. He published a collection of his stories in the latter place in 1839, but obtained absolutely nothing for them. His powerful tale of *The Murders in the Rue Morgue* appeared in 1841 and may be considered the foundation of the modern detective story. His popularity in France was due to this work. Two French journals used the story without acknowledgment and a libel action arose between them, in the course of which Poe's name was frequently mentioned,

with the result that he gained a reputation in that country such as few English authors have achieved. Poe's propensity to liquor had been increasing slowly, when his wife fell ill. They were in poverty at this time—relieved for a while by £20 which he won by his story of *The Gold Bug* (1843)—and Poe went to New York again in 1844. In 1845 appeared *The Raven and other Poems*, and the disappointment caused by the utter indifference to his writings led Poe to indulge still further in stimulants. He wrote very severely against many of his contemporaries and was a savage critic. About 1846 a public appeal was made for him and his family and in 1847 his wife died. Poe now knew no restraint and seems to have gone from bad to worse. Though his faults have been even more exaggerated than his virtues, it is quite certain that he was found unconscious in a liquor saloon at Baltimore on October 3rd, 1849, and died of delirium tremens four days afterwards. He was then about to be married to a widow of Richmond, Virginia. Poe is probably the greatest literary genius America has yet produced and is now as honoured as he was in life neglected. In 1875 a monument was raised to his memory in Baltimore. The best English edition of his works is that by Mr. John H. Ingram.

Poerio, CARLO, Italian patriot, the son of a lawyer in Naples, was born in 1803. On his return from the exile in which he had accompanied his father, he practised as an advocate in Naples. But actively sympathising with those who sought to drive the Bourbons from Italy, he was arrested and imprisoned several times between 1837 and 1848, in which year, after certain concessions of king Ferdinand, he became prefect of police at Naples and Minister of Public Instruction. The king was playing falsely, however, and Poerio soon resigned. On July 19th, 1849, he was arrested as a conspirator and sentenced to twenty-four years' imprisonment in chains. W. E. Gladstone's famous Letter to Lord Aberdeen calling attention to the infamies of the Neapolitan dungeons and the case of Poerio aroused universal indignation. Still, relief was long in coming. In 1858 the king was prevailed upon to ship the political prisoners to the United States, but Poerio induced the captain to land them at Cork. Hence he made his way to London and in 1859 arrived at Turin. Elected member of the Italian Parliament in 1860 he became next year its Vice-President. He died in Florence on April 28th, 1867.

Poet Laureate, an office in the household of the British sovereign, the origin of which is obscure. The name is thought to have arisen from the custom of the English Universities presenting graduates in rhetoric and Latin versification with a laurel leaf. Roger or Raherus, founder of the monastery of St. Bartholomew in Smithfield in the reign of Henry I., was described as King's minstrel. William the Foreigner was taken by Richard I. to celebrate his master's deeds in Palestine. In the reign of Henry III. there was a Versificator Regis whose stipend was one hundred shillings. Baston, a Carmelite friar, accompanied Edward II. into

Scotland. Chaucer assumed the title and in 1389, the twelfth year of Richard II., was granted an annual allowance of wine. The first laureate appointed was John Kaye in the reign of Edward IV.; Andrew Bernard was laureate in the time of Henry VII., and John Skelton, who described himself as "Poeta Skelton Laureatus," under Henry VIII. The first poet laureate in the modern sense was Edmund Spenser, to whom Queen Elizabeth granted a pension of £50 in 1591. Spenser died in 1599, and Samuel Daniel succeeded to the office. James I. granted his laureate a yearly pension of 100 marks. Daniel was succeeded in 1619 by Ben Jonson, who was appointed by formal letters patent by Charles I., who raised the stipend, on Jonson's rhyming petition, to the "best of monarchs, masters, men, King Charles," to £100 sterling, with a grant of one tierce (a cask of 35 gallons) of Canary wine from the king's store yearly. The wine, as Lord Macaulay records, was shabbily discontinued by James II., but must have been allowed later as it was ultimately commuted for £27 a year in the laureateship of Pye. Jonson died in 1637, and the next laureate, Sir William Davenant, was not appointed until 1660. He died in 1668, and his successors were John Dryden (who was paid the salary for the intervening two years), 1670-89; Thomas Shadwell, 1689-92; Nahum Tate, 1692-1715; Nicholas Rowe, 1715-18; Rev. Lawrence Eusden (who began a series of Birthday and New Year's Odes, "his quit-rent odes" Cowper quaintly styled them, which fell into abeyance when Pye died), 1718-30; Colley Cibber, 1730-57; William Whitehead, on Gray declining the office, 1757-85; Rev. Dr. Thomas Warton, 1785-90; Henry James Pye, 1790-1813; Robert Southey, on the refusal of Sir Walter Scott, 1813-43; William Wordsworth, 1843-50; Alfred, Lord Tennyson, 1850-92; and, after an interval, Alfred Austin was appointed in 1896.

Poetry is a subject hardly less difficult of definition than Religion, into which, indeed, in its higher reaches, it runs up. There has, in particular, been great difference among philosophers and critics as to whether metre is one of its essential elements. To Aristotle and Plato rhythm was of subordinate importance, and among modern philosophers Coleridge explicitly declares that there may be poetry (as distinct from a poem) without metre. The set of more recent authority, however, appears to be in the other direction. Etymology undoubtedly favours the more comprehensive definition, for among the Greeks *poietes* signified "a maker," "a creator," not necessarily of song, nor even of any other work of art. A consideration of much greater weight is that the opposite view implies the equal importance of form with contents, since it is admitted that there is much prose which lacks no quality of the highest poetry save that from its structure regular rhythm is absent. Nor even in form is the difference between verse and prose-poetry absolute; for the latter almost invariably falls into a rhythm of its own—less regular than that of verse, but none the less yielding abundant pleasure to the ear by its mere movement. To say that there can be no poetry without metre is to

assert that there is no poetry in Hebrew literature, which, though it has no nearer approach to rhythm than parallelism, nor to rhyme than assonance, has yet produced the Book of Job, the Prophecies of Isaiah, the Psalms, the Canticles, and the Song of Deborah. On the whole, therefore, it seems preferable to define poetry as the art in which imagination, fancy, and emotion have for their medium elevated language, sometimes rhymed, and generally metrical. By Coleridge the origin of metre is traced to a spontaneous effort in the creating mind to hold in check the working of passion and so to ensure it against the evil of unrestrained expression. This, however, is to assume that the creating mind achieves no more than it intends. It is excessively difficult to see how an aim so remote and calling for so resolute an exercise of the will, could fail to be present to the poet's consciousness, whereas it is matter of universal experience, as indeed Coleridge concedes, that the expression of imagination and passion in language more or less rhythmical is purely instinctive. It might with as much, or as little, plausibility be suggested that when the poet adds to his metre rhyme, he does so in order further to increase his difficulties, and not because of the enhanced pleasure which he derives from the musical terminations of his verses and wishes to communicate to his reader. Poetry is divided into three main categories—lyric or subjective, including the song, the hymn, the elegy, the ode, the sonnet; epic or narrative, to which the ballad belongs; and dramatic. In a single word these categories may be expressed as Song, Tale, Play. It is not easy, however, to find a place under any of these heads for didactic and satirical poetry. A large part of the production in both these kinds occupies neutral territory between poetry and prose, being prose as to its contents and poetry as to its form. It may be worth consideration whether, having regard to the tendency of the times to analytic and philosophic poetry, the time has not come to erect a fourth category—the reflective—which would relieve the epic and the lyric of much that does not naturally fall within the province of either. The monologue, a form which Robert Browning did so much to develop on the dramatic side, is often at once lyric, epic, and dramatic.

Pogge (*Agonus cataphractus*), a small acanthopterygian, or spiny-finned fish, having the head and body angular, and covered with bony plates. It is sometimes known as the Armed Bullhead, is about six inches long and is met with in the northern seas of Europe and often caught off the British coast. It also frequents the mouths of rivers. It has a very small mouth that is unable to take an ordinary hook and a wide head defended with bones and armed with spines. Its colour is brown. The Armed or Mailed Gurnard (*Peristethus cataphractus*)—which, with the Pogge, belongs to the family Cataphracti—is a red fish with a large head and remarkably long snout. Its body is octagonal and covered with a series of large plates and the fins are well developed. [BULLHEAD.]

Poggio, GIOVANNI FRANCESCO, otherwise BRACCIOLINI, scholar, was born at Terranova, near

Florence, in 1380, and when twenty-two years old entered the Papal service as secretary of Boniface IX. His enthusiasm for the classics and his great learning led to his instituting searches for copies of ancient works in the monasteries of Italy and other countries, particularly at St. Gall, and he made some remarkable discoveries, including Quintilian's *Institution*, the greater portion of Lucretius' *De Rerum Natura*, eight orations of Cicero, twelve comedies of Plautus, etc. His bad temper and quarrelsome disposition, however, embroiled him with many scholars and injured his contemporary renown. In 1417 he came to England, where he resided awhile. He died in 1459 at Florence, of whose republic he was chancellor, and among his best-known works, which are all in Latin, are his *History of Florence* and his very gross *Facetia*.

Poinsettia, a name still commonly applied by florists to a South American species of Euphorbia, extensively grown in hothouses. It is remarkable for its large, pointed, veined, and leaf-like bracts, either deep-red, or less commonly ivory-white, which surround the inconspicuous flower-heads. In sub-tropical regions it is shrubby; but in such climates as that of the British Isles it is only a pot-plant. It is frequently used in church decorations. There is no botanical characters to separate it as a genus from Euphorbia. It is sometimes popularly known as Christmas Flower and Easter Flower and, in England, as Lobster Flower and Mexican Flame Leaf. It was named after Joel Roberts Poinsett (1779-1851), a United States minister to Mexico, who discovered it in that country in 1828.

Point is a mathematical conception used to define position. It has no dimensions; two points placed so as to touch each other will occupy no more space than one point—in fact, no finite number of them will form anything larger. A circle of infinite curvature becomes a point.

Point de Galle. [GALLE.]

Pointer, a breed of sporting dogs of Spanish origin, introduced into England in the 18th century, and since then modified with a strain of foxhound blood to such an extent that, according to George Borrow, the present English breed differs totally from any native Spanish dog. Pointers are of medium size, close-haired, generally liver-coloured or liver and white; some, however, are black, and others again show the tan markings of the hound. The peculiar habits of this dog are indicated in the name. As soon as it scents game, it stands still, with muzzle raised and "pointing" in that direction; one fore-leg is usually also lifted, and the tail sticks out straight behind. A very interesting and indeed remarkable circumstance with regard to this habit is that it is inherited, a young dog pointing instinctively the first time it is taken into the field. Since driving and walking up birds has become common, the use of pointers has been on the decrease.

Poison. A poison is a substance which, when introduced into the body, is capable, by virtue of its own inherent chemical properties, of causing



POISONOUS PLANTS.—II.

1. HERB PARIS (*Paris quadrifolia*).
3. THORN APPLE (*Datura Stramonium*).
5. FOOL'S PARSLEY (*Æthusa Cynapium*).

2. DEADLY NIGHTSHADE (*Atropa Belladonna*).
4. HENBANE (*Hyoscyamus niger*).
6. MEZEREON (*Daphne mezereum*).

impairment of health or of destroying life. Poisons have been classed as irritants and neurotics, the latter group being sometimes subdivided into narcotics and narcotico-acids. The principal irritant poisons are the mineral acids, oxalic acid, the alkalies, phosphorus, arsenic, antimony; certain salts of copper, mercury, and lead; savin, croton oil, colchicum, and cantharides. The chief symptoms produced by poisons of this kind are those of irritation of the alimentary tract; pain, nausea or actual vomiting and purging are common; cramp in the limbs, and faintness or even extreme collapse may be present. Some of these poisons actually corrode the tissues subjected to their influence; this notably happens in the case of the mineral poisons. The chief neurotic poisons are opium, belladonna, alcohol, ether, chloroform, chloral, prussic acid, strychnia. These poisons act mainly upon the nervous system. Certain gases when inhaled exercise poisonous properties. The chief of these are carbonic acid, which collects in mines and in connection with the burning of lime; carbonic oxide, which is a constituent of coal-gas and is developed in charcoal-burning; and sulphuretted hydrogen. The treatment of poisoning consists, first, in removing as much of the poison as possible from the system and, secondly, in attempting to neutralise the action of so much of the poison as cannot be removed by the administration of the appropriate antidote. The use of the stomach pump is generally resorted to with a view to removing the poison from the stomach. In the case of some corrosive poisons this plan, however, cannot be adopted. If the contents of the stomach cannot be immediately evacuated by other means an emetic is sometimes employed, sulphate of zinc in a dose of twenty grains for an adult being one of the most trustworthy forms of emetic to use. In the case of a child a teaspoonful of ipecacuanha wine may produce the desired effect. It is only in the case of a few poisons that satisfactory antidotes exist. In poisoning by mineral acids, chalk or carbonate of magnesia is employed; in poisoning by alkalies, lemon juice or vinegar may be administered. The antidote for arsenic is the freshly precipitated ferric hydrate; for oxalic acid, saccharated solution of lime; for perchloride of mercury, white of egg; for lead salts, sulphate of magnesia; and for tartar emetic, tannic acid in solution in the form of strong tea may be given. Several fungi and wild flowers are extremely poisonous. In the case of mushrooms those that are unwholesomely gaudy in colour and those that have an appearance of rottenness are alike dangerous. In respect of wild flowers the most common poisonous kinds include Autumn Crocus (*Colchicum autumnale*), Cypress Spurge (*Euphorbia cyparissias*), Deadly Nightshade (*Atropa belladonna*), Fool's Parsley (*Aethusa cynapium*), Foxglove (*Digitalis purpurea*), Hemlock (*Conium maculatum*), Henbane (*Hyoscyamus niger*), Herb Paris (*Paris quadrifolia*), Mezereum (*Daphne Mezereum*), Pasque Flower (*Anemone pulsatilla*), Thorn Apple (*Datura Stramonium*), and Water Hemlock (*Ciuta virosa*). Owing to their prevalence and the attractive look of their berries, children should early be warned of their deadly properties.

Poisson, SIMÉON DENIS, mathematician, was born at Pithiviers, in the department of Loiret, France, on June 21st, 1781. Manifesting an extraordinary bent for mathematics, he was sent to the École Polytechnique in Paris, where his brilliant talents immediately attracted the notice of Lagrange and Laplace. After passing through the classes he became successively assistant professor, professor, and examiner at the Polytechnique, his connection with it lasting forty years. He produced some profound mathematical works, and was the discoverer of some important truths, gaining thereby a European reputation. In 1825 he was made a baron, but he never took out his diploma or used the title. His *Traité de Mécanique* is of the highest value to advanced students, and his *Théorie Mathématique de la Chaleur* is a masterly examination of the causes of the conduction of heat. He died at Sceaux, near Paris, on April 25th, 1840. His biography was written by Arago and one of his cherished maxims was "La Vie c'est le Travail" ("Work is Life").

Poitiers, formerly the capital of Poitou, and now the chief town of the department of Vienne, France, on a plateau above the junction of the Boivre and Clain, 206 miles S.W. of Paris. Named after its Gallic founders the Pictones or Pictavi, it was Christianised in the 3rd century, its first bishop being St. Hilary. It then passed into the hands of the Visigoths, whose king, Alaric, was defeated by Clovis not far from the town in 507. It went as part of the dowry of Eleanor of Guienne to the English Crown in 1133, but was recovered by Philip Augustus. The battle of Poitiers (1356) restored it to Edward III. for a few years, when Duguesclin finally added it to French territory. The cathedral of St. Pierre, founded by Eleanor, contains the bones of Richard Cœur de Lion, and the church of St. Jean is the oldest Christian structure in France, but now serves as a museum. Other interesting churches are those of St. Hilaire and St. Radegonde and Notre Dame la Grande. The principal structures include the Palais de Justice, formerly the mansion of the Dukes of Aquitaine and the Counts of Poitiers, and the truncated Maubergeon Tower contiguous to it; the modern Renaissance Hôtel-de-ville, containing a picture gallery and a natural history museum, and the old Hôtel-de-ville, accommodating the ancient university and the valuable collection of antiquities belonging to the Antiquaires de l'Ouest, who were largely responsible for the restoration of the fine 11th-century tower of St. Porchaire. The industries comprise brewing and the making of hosiery and cloth. Pop. (1901), 39,565.

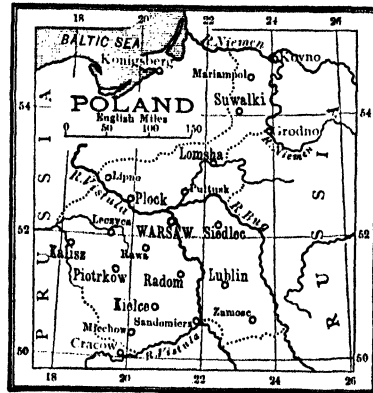
Poitou, an old province of France, derives its name from the Pictones or Pictavi, the tribe found in occupation of the district by the Romans. Bounded on the N. by Touraine, Anjou and Brittany, on the E. by Touraine, Berri and Marche, on the S. by Angoumois, Saintonge and Aunis, and on the W. by the Bay of Biscay, it was divided into Upper and Lower Poitou. The former is now comprised in the departments of Deux-Sèvres and Vienne, the latter in that of La Vendée.

Poker, a game of cards played by two or more persons with a full pack of fifty-two cards, which rank as in whist. The dealer distributes five cards to each player, after each has placed in the pool a stake called an *ante*. Any player may discard and take fresh cards up to five (according to the number he throws out) from the undealt portion of the pack. The eldest hand then puts another stake in the pool or retires from the game, the next hand having the right of staking higher or calling (*i.e.*, equalling the stake and claiming a show of hands), or withdrawing; and so on all round. If only one player be left he will take the pool; if a player call, those who follow may stake the same amount and the highest hand will gain the pool. The hands are valued thus, beginning with the highest:—(1) a straight flush, a sequence of five cards of the same suit; (2) four, four cards of the same rank; (3) a full, three cards of the same rank and a pair; (4) a flush, five cards of the same suit not in sequence; (5) a straight, a sequence of five cards of different suits; (6) triplets, three cards of the same rank; (7) two pairs; (8) one pair; (9) the highest card in any hand.

Pola, the chief naval station and arsenal of Austria-Hungary, near the southern extremity of the peninsula of Istria, at the head of the Adriatic, 55 miles south of Trieste. The port, divided into two basins by several islets, is almost land-locked, and has strong fortifications. Everything needed for a large fleet can be made in the arsenal, whilst there is ample accommodation for the growing commercial traffic, the harbour being one of the finest in Europe. The principal buildings include the 17th-century castle on a hill formerly crowned by the Roman capitol, the 15th-century cathedral, the Franciscan convent; the Town Hall; the marine arsenal (with a naval museum); the casino, and the observatory. There are few manufactures excepting of naval stores, but the import and export trade is very considerable. The Roman remains are exceptionally interesting and include the amphitheatre (with accommodation for 20,000 spectators and said to be the only extant example the outer walls of which are intact); the triumphal arch erected shortly after the battle of Actium (31 B.C.); the temple of Augustus and Roma and a fragment of a temple of Diana. It was originally a Thracian colony, was captured by the Romans in 178 B.C., was destroyed by Augustus for siding with Pompey, was rebuilt at the instigation of his daughter Julia, became later the capital of the Counts of Istria, was destroyed by the Genoese in 1379, was under Venetian rule till 1797 and was acquired by Austria in 1815. Its modern prosperity dates from 1848, when it was selected as the naval base and headquarters of the Admiralty of Austria-Hungary. Pop. (1900), 45,052.

Poland, the name still generally applied to so much of the Polish territory absorbed by Russia as was formed into an autonomous kingdom in 1815, although after 1864 this part of the Russian Empire was officially designated "the territory of the Vistula," and, later, "the Vistula governments." The native name is *Polska*, from the same root as

pole, "a plain"; and the territory, which measures 49,018 square miles, consists for the most part of an undulating plain from 300 to 450 feet above the sea, joining the lowlands of Brandenburg on the west to the great plain of Central Russia on the east, but gradually rising in the south to a range of plateaus which vary in height from 800 to 1,000 feet and blend with the spurs of the Carpathians. The chief rivers are the Vistula with its affluent the Bug, the Warthe and Prosna (tributaries of the Oder) and the Niemen. Poland is bounded on the N. by the provinces of western and eastern Prussia, on the W. by Posen and Prussian Silesia, on the S. by Galicia, and on the E. by the Russian governments of Volhynia, Grodno, Vilna and Kovno, and is divided into ten provinces—those of Kalisz, Kielce, Lomza, Lublin, Piotrkow, Plock, Radom, Siedlce, Suwalki and Warsaw. It is rich in minerals, but agriculture is the main industry. In the eastern districts there are large tracts of sand, swamp and



SKETCH MAP OF POLAND.

heath; but for the most part the soil is a rich loam, yielding abundant crops of rye, oats, wheat, barley, flax, hemp, potatoes, but bearing also extensive forests (occupying $6\frac{1}{2}$ millions of acres) of pine, oak, birch, etc., while large portions are devoted to pasture. The minerals comprise iron, copper, zinc, salt and coal, and the leading manufactures are those of textiles, metal products, sugar and liquors. The principal places are served by railways. There is no trial by jury, and the entire administration is subject to a Governor-General. The total population of Poland (1904) amounted to 10,607,300 or 216 to the square mile. Warsaw is the chief town with a population (1901) of 756,426. Other important towns are Lodz (351,570), Czenstochow (53,650), Lublin (50,152), Piotrkow (32,173), Radom (30,126) and Bendin (25,498). The only university is in Warsaw; the Roman Catholics greatly predominate, but the Jews are very numerous. The country is defended by the Polish Quadrilateral (Novogeorgievsk on the right of the Vistula, Warsaw and Ivangorod on the left, and Brest-Litovsk on the Bug).

The so-called "kingdom of Poland" of to-day is

all that now, even in common speech, bears the name of a nation that once dominated Europe and saved Christendom from the Turk. Its history may be said to begin in the 9th century with the founding of the Piast dynasty. The first Christian monarch was Mieczyslaw I. (962-92). His son, Boleslaw I., "the Great," pushed back the frontiers of the kingdom beyond the Oder, the Carpathians, and the Dniester, and wrested Cracovia, Moravia, Lusatia and Misnia from Henry II. of Germany. The line ended with Casimir III. in 1370. It was followed after an interval of eighteen years by that of the Jagellons, the first of the dynasty being Wladyslaw IV., by whom Lithuania and Poland were united, and who was also chosen King of Hungary. When this line in turn became extinct, with the death of Sigismund II. in 1572, after a period of great military achievement and internal development, the monarchy, at the instance of the military classes, became formally elective, the election to be by the unanimous vote of the two chambers of the Diet—that of the chief nobles and that of nuncios representing the lesser nobles. The bitter intolerance, religious and political, which had much to do with the decadence and downfall of Poland, first became prominent in the reigns of the three Swedish kings Sigismund III., Wladyslaw IV. and John Casimir, whose rule extended from 1586 to 1668. The Cossacks of the Ukraine, who had been subdued in the preceding reign, were oppressed until they revolted and sought the aid of Russia. In 1673 the Turks, after a career of victory, were overwhelmed at Chocim (Khotin) by John Sobieski the Hetman, who was then chosen king and reigned from 1674 to 1696. The early years of the 18th century were years of persecution and anarchy. Later in this century (in 1766) Russia, Denmark, Prussia, and Great Britain interfered on behalf of the persecuted Dissidents from the dominant Roman Catholic faith. The civil war which followed was taken advantage of by Austria to resume the county of Zips, which had been pledged by Hungary to Poland early in the 15th century. Russia and Prussia needed no other excuse for effecting the partition which they had long meditated. In this first partition, in 1772, when Poland had an area of 282,000 square miles with a population of some thirteen millions, Russia appropriated 42,000 square miles, Prussia 13,000, and Austria 27,000. The second division, in which Catherine II. was the moving spirit, followed in 1793 in spite of heroic resistance headed by Joseph Poniatowski and Kosciusko; Russia this time not being content with less than 96,000 square miles, while Prussia was only adequately rewarded by 22,000. Only two years later the work of dismemberment was completed after a series of desperate battles, in which the Russian and Prussian armies were defeated, and Poland was only finally overpowered by the intervention of Austria. What was left of Poland was now divided between the three powers—Russia again taking the lion's share—and Poland ceased to be. In all, Russia had absorbed 180,000 square miles, Prussia 57,000, and Austria 45,000. By the Treaty of Vienna the division was somewhat modified in favour of Russia, and it was

then that the "kingdom of Poland" was constituted. At first it possessed full autonomy, the only link between it and Russia being that its sovereign was the Tsar. But in 1832 it was deprived of its constitution, and in 1864 it was absolutely incorporated with Russia; and the steady policy of the Russian Government ever since has been ruthlessly to crush out the sentiment of nationality in every form. Austria and Prussia have had comparatively little trouble with their portions of the spoil; but Russia has had to encounter several formidable rebellions, which have been suppressed with cruel severity. Even so recently as 1906 massacres took place on small provocation in Warsaw and Siedlce and other towns. Russian methods have long ceased "to stagger humanity," but throughout all her dealings with Poland she has invariably ruled with an iron hand, even the use of the Polish language in public places and for public purposes being prohibited. The lot of the peasants has been considerably ameliorated, mainly at the expense of the nobles, whose treatment of their former serfs gave them little title to sympathy; but there is no evidence that even the peasant proprietors have been won over to their conquerors.

Ethnology. Before its dismemberment Poland comprised four ethnical groups: Lithuanians in the north, White Russians in the east, Little Russians (Ruthenians) in the south, and Poles in the centre and west. These have been identified by Schafarik with Ptolemy's *Bulanes* (2nd century): but they more probably represent the great Slav nation of the *Lekhs* (*Liakhs*), who were seated on the Vistula in the 6th century, and one of whose chief branches were the *Polianes* or "people of the plains," from *polé* (Polish *polak*), "a plain." Since their conversion by Roman missionaries in the reign of Mieczyslaw (962-92), the Poles have always been Roman Catholics of the Latin rite, and their culture has consequently been developed under Western influences. The language, a rich and flexible member of the West Slav division, is written in the Roman character, has borrowed many Latin words, and has even been partly moulded on the model of Latin, which was the language of culture and a common medium of intercourse down to the close of the 18th century. Since then the national speech has been assiduously cultivated by numerous writers, especially historians and poets, some of a high order of merit. The purest Polish type is found in the middle Vistula basin and in Posen, where the upper classes are distinguished by regular (and even handsome) features, tall, stout figures, fair complexion, light or chestnut hair, a frank, intelligent expression. They are a gay, light-hearted, impulsive, brave, and hospitable people; but with the faults and vices inherent in a social system which for ages recognised only two classes—nobles and serfs.

Polar Bear (*Ursus maritimus*), from the Arctic Regions, the "Nennok" of the Eskimo, the largest member of the family. The total length is about nine feet; the head is small, with pointed muzzle, the molars are narrow, and the soles and palms are

hairy. The fur is white, or, rather, of a light creamy colour throughout the year. Its food chiefly consists of seals, but the creature is omnivorous and will often clear an islet of eider-duck eggs in a few hours. Since it is able to obtain food all the year round, it has no occasion to hibernate, like its vegetable-eating congeners. The tales that have been circulated concerning its ferocity are pronounced by Dr. Robert Brown, who had ample opportunity of studying the animal in its native haunts, to be grossly exaggerated. Whenever he



POLAR BEAR.
(*Ursus maritimus*.)

hunted it its only thought was how to escape its pursuers. "I should have hesitated a good deal," he wrote, "before making so free with the Grizzly Bear of the Californian wilds (*Ursus ferus*), which is, perhaps, the most ferocious animal on the American Continent. Though seemingly so unwieldy, the Nennok runs with great speed and, being almost marine in its habits, it swims well. I have chased it with a picked crew of eight whalemen and yet the Bear has managed to distance us in the race for the ice-fields." At close quarters it does not hug but bites, and it will not eat its prey until it is dead, playing with it as does a cat with a mouse. Sometimes the Eskimo eat its flesh, though parts of it, the liver particularly, are said to be poisonous. William Scoresby noted this fact and Dr. Kane, who experimented on

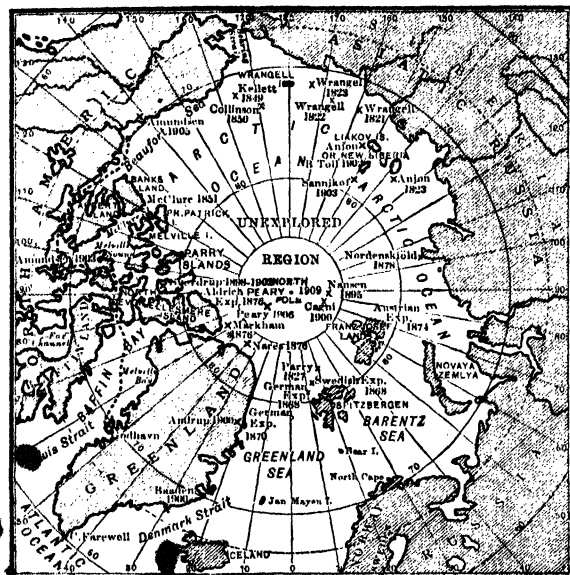
himself, was upset by the first taste. The fat is used for burning and has not the unpleasant smell of train-oil. The Polar Bear is usually a familiar figure in the Zoological Gardens in London.

Polar Exploration has been carried on both in the Arctic and Antarctic Circles, in the one case as far as 87° 6' N., in the other to 78° 34' S. The earliest efforts in the direction of the North Pole appear to have been made by the Norsemen; but systematic exploration of a later date had its origin in the attempt to discover a North-eastern and North-western passage to India and eastern Asia, with a view to facility of trade. This hope was soon abandoned, and later expeditions have been undertaken out of love of adventure, or to advance scientific ends, or, in some cases, for the sake of discovering the fate of earlier expeditions. In 1497 Cabot found Labrador and Newfoundland, and in 1553 Sir Hugh Willoughby sighted Nova Zembla. Many other adventurers of different nationalities explored in an eastern direction, but this path soon became abandoned for a time. In the long list of Arctic explorers proper may be mentioned Frobisher (1576), Davis (1585), Hudson (1610), Baffin (1615), Bering (c. 1749), a Russian explorer; Scoresby, who added much to our knowledge of these regions (1806); Franklin, who perished in his last expedition (1845); Ross, Parry, McClure, who actually did make the North-western passage; McClintock (1857), the Americans Kane, Hayes and Greeley, and the Swede Nordenskiöld (who accomplished the North-east passage in 1878-9) and the Norwegian Nansen. As was to be expected, later explorers, better equipped, were able to reach higher latitudes towards both Poles. In Arctic Regions concerned, R. E. Peary, starting from Whale Sound, made 82° 12' on June 26th, 1892; F. Nansen, in his memorable drift with the *Fram*, which began in autumn, 1893, reached his furthest North (86° 13') on April 8th, 1895; the Duke of Abruzzi, in the *Stella Polare*, despatched from Rudolf Land in the spring of 1900 three sledge expeditions of which one, under Captain Cagni, made 86° 33'; and R. E. Peary, in 1906, reached 87° 6'. For the recent expeditions of Peary (q.v.) and others see ARCTIC SEA and ARCTIC EXPLORATION. Concerning the Antarctic Regions, the *Challenger* was the first steamer to cross the Antarctic Circle (February 16, 1874), although only reaching 66° 40'; Captain Larsen, in the Norwegian *Jason*, made 68° 10', off the eastern coast of Graham Land in 1893, in which year also Captain Evensen, another Norwegian, in the *Hertha*, sighted Alexander Land, reaching 69° 10'; on January 22nd, 1895, Captain Christensen, in the Norwegian *Antarctic*, reached Coulman Island in 74°; on May 31st, 1898, the *Belgica*, a Belgian ship, equipped by international assistance, made her most southerly latitude in 71° 35'; the *Valdivia*, chartered by the German Government, reached 64° 15' in 64° 20' E. on December 16th, 1898; C. E. Borchgrevink, in the *Southern Cross*, made 78° 34' in 164° 10' W. on February 17th, 1900, the Antarctic record; and on October 14th, 1901, Captain R. F. Scott, in the *Discovery*, was able to reach

62° 50' in 139° 40' E. Further expeditions to the Antarctic started in 1910.

Polarisation, ELECTROLYTIC. When an electrolyte is decomposed by an electric current, a difference of potential is set up between the anode and cathode which opposes the passage of the current. This represents the force needed to tear apart the molecules of the electrolyte, and is known as the electromotive force of polarisation. If, for instance, water is to be decomposed, at least 1.47 volt is needed; and if, after disconnecting the source of current, the electrodes of the volta-

and if the beam of light makes an angle of 58° with the normal to the surface, practically all the reflected light will be thus modified. Plane polarisation consists in this quenching or diverting of all the vibrations save those in one particular plane. Some substances, such as tourmaline, will only transmit light whose vibrations are in one plane. Iceland spar, which has the property of double refraction, splits up ordinary light into two portions; by cutting a rhomb of spar diagonally and cementing the halves together with Canada balsam these portions may be separated. These two rays, called the ordinary and extraordinary rays, are diffracted in a different ratio by Iceland spar and Canada balsam, from which it results that the ordinary ray is totally reflected [TOTAL REFLECTION] and passes out through one side of the rhomb, the extraordinary ray passing straight through; the latter portion is completely polarised. This arrangement, known as Nicol's prism, is the most perfect device for polarising light. If polarised light falls upon a second polarising body, it may or may not be absorbed; for if we quench the vibrations which are not in one plane (i.e., polarise the light) and then further quench those vibrations which are not in a second plane, it is clear that, if these two planes are coincident, the light will not be affected; but if the second plane makes an angle with the first, the light will be more or less extinguished, and will be completely so if the two planes are at right angles. In this case the first Nicol prism or other device is called a polariser, and the second an analyser. Many substances exercise a peculiar influence on polarised light. If a thin film of selenite or mica is introduced between the polariser and analyser, and viewed through the latter, it will in some positions restore the light after it has been extinguished by crossing the prisms; and may, moreover, exhibit brilliant



SKETCH MAP OF NORTH POLAR EXPLORATION.

meter are connected to an electrometer, they will be found to differ in potential by that amount. [ELECTRICITY.] The term is also used to denote an action which occurs in galvanic batteries: hydrogen tends to be deposited in small bubbles on the surface of the positive pole, reducing its effective area and so diminishing the action of the cell. [BATTERY.]

Polarisation of Light. When light is transmitted through, or reflected from, certain substances, it is changed in a peculiar way, and is said to be polarised. Light is caused by ether vibrations, which take place in all directions in a plane at right angles to the direction of the ray, and if light falls upon a surface—say, of glass—it is found that a portion is transmitted through the glass and a portion is reflected. A part of the reflected portion has the peculiarity that its vibrations are all in a plane parallel to the glass, the vibrations in other planes having been transmitted through the glass;

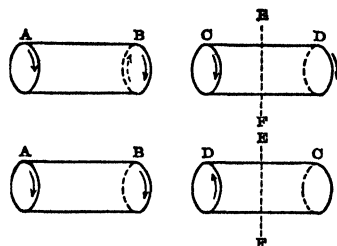
colours, which at first disappear as the analyser is turned; when it has moved 90° from its former position, colours complementary to the former are seen. Many fine effects may be projected on a screen by a lantern by using designs built up of plates of selenite of varying degrees of thickness; the colours change as the analyser is rotated. In these experiments the polarised light is split up into two components vibrating in two planes at 45° to that of the polarised beam; these two are retarded unequally by the film of selenite, so that, when re-combined into a single beam by the analyser, the difference in phase of the two sets of vibrations produces interference. Analogous effects are produced by non-crystalline bodies when in a state of strain due to unequal heating, mechanical pressure, or otherwise. Some bodies, such as quartz and sugar solutions, rotate the plane of polarisation—that is, if introduced between two crossed Nicol prisms, the light will be restored and will not again be extinguished until the analyser

has been turned in one direction or the other. If a tube of carbon disulphide or a piece of Faraday's heavy glass is placed between the polariser and analyser and subjected to the action of a powerful magnetic field, the plane of polarisation will be rotated, the direction being reversed on reversal of the magnet. A similar effect is produced by subjecting carbon disulphide to electrostatic strain.

Polariscope, or **POLARIMETER**, is an instrument for measuring the amount of rotation produced by a substance on the plane of polarisation of plane polarised light. In its simplest form it would consist of two Nicol's prisms; parallel light sent through the first or "polariser" would be polarised in one plane; it then passes through a second Nicol or "analyser." An observer looking through the analyser will have the field of view variously illuminated according to its position. By rotating this Nicol round an axis perpendicular to its plane a point can be reached when all appears dark—i.e., the incident light is completely quenched. If now an "active" substance be put between polariser and analyser, more or less light will get through; by again rotating the analyser the dark position can be rediscovered. The amount of rotation measures the angle through which the active substance has rotated the plane of polarisation. Since it is not easy to be quite certain when the position of absolute darkness is obtained, various devices have been used to avoid the difficulty. The field of view is divided into two parts, and some arrangement is used so that the planes of polarisation of the light are slightly inclined to each other in the two halves. In one case this effect is produced by dividing the analyser into two parts, which are connected together after one of them has been turned end for end. The observer, in using this analyser, rotates it until the two halves are equally dark. Another instrument is provided with what is known as a "biquartz," the two parts of which turn the plane of polarisation in opposite directions; in this arrangement the two parts of the field are brightly coloured, the hues changing as the analysing Nicol's prism is rotated. A position is obtained when the colours of the two halves of the field are the same. Not only crystalline solids have the power of rotating the plane of polarisation of light, but solutions of many substances have the same property, and the amount of rotation produced by a solution in a tube of definite length is often used to determine the amount of active substance present.

Polarity. The two ends of a magnet behave in exactly opposite ways with regard to other magnets and electric currents, and on this account a magnet is said to possess polarity; it has two poles endowed with opposite properties. This is not to be explained by supposing the two ends magnetised with different kinds of magnetism, for such is not the fact; the nature of magnetism is essentially rotary and all rotating bodies possess a kind of polarity. Suppose two cylinders, A B and C D, to be rotating on their axes in the same direction, the ends B and C are, of course, turning in the same direction as shown in the upper figure (see diagram); but if, without changing the direction of

its rotation, we now turn C D about a line E F so as to bring it into the position shown in the lower figure, the ends B and D are turning in opposite directions. Now these two cylinders may be considered roughly analogous to two magnets, if we substitute a whirl of electricity for the actual



rotation of the cylinders; then A and C would be, say, north poles, and B and D south poles. This two-endedness, or polarity, is characteristic of rotating bodies; a revolving shaft appears to be turning either right-handedly or left-handedly as we view it from one end or the other. A coil of wire carrying a current behaves, of course, just like a magnet and similarly has polarity.

Polder, the name given in Holland and Flanders to marsh land reclaimed from river or sea. The general method of reclaiming is to erect a dyke to keep out the lower tides and gradually raise and extend it as occasion offers. The lake of Haarlem, in Holland, has been converted into polder, and all along the lower Scheldt may be seen fertile polders covered with cattle and having far inland the remains of ancient dykes, while nearer the river fresh polders are in course of formation. "Since the Middle Ages," says David S. Meldrum in *Holland and the Hollanders*, "the Dutch have been reclaiming their country from these inner waters. There is a tradition that, as early as the beginning of the 15th century, a hydraulic windmill was set up near Alkmaar. Early in the next, it is probable, impoldering was in general practice on a small scale. In 1600, we know, the Zijpe, in the north of North Holland, was drained. By 1625 the Purmer, the Wormer, the Beemster, the polders to the north of Amsterdam, as well as those to the east of Stavoren, and between Workum and Hindelopen, had come into existence. The Schermer followed soon afterwards. In 1643 Adriaensz Leeghwater published a scheme for draining seventeen thousand acres of that inland sea. Two hundred years later his dream was being realised by the aid of steam. Between 1833 and 1877 Holland had increased from 8,768 square miles to 12,731 square miles. In that extension were included, besides the bed of the Haarlem Lake, the Y polders created by the drainage of the Y at the making of the North Sea Canal." Little of value now remains to be reclaimed in the interior, and should the Dutch sigh for more land they will have to tackle the Zuider Zee. It has constantly been suggested that in England many

thousands of acres might be added to the cultivable land of Lincolnshire by the adoption of similar measures to those that have yielded such wonderful results in Holland.

Pole. The imaginary ends of the axis about which the earth turns are known in geography as the north and south poles, and this is the most popular use of the word. In the geometry of a sphere the pole of any circle is the point in which a perpendicular to the plane of the circle through its centre cuts the sphere. Every point on the circle is therefore equidistant from it, and, if the circle be a great circle, the distance is 90° . The north and south poles are thus the geometrical poles of the earth's equator. In astronomy they are the points in which the earth's axis, if produced, cuts the celestial sphere; for the sake of distinction, these are often known as the celestial poles. No stars occur actually at these points (where they would be extremely convenient for astronomical measurements); but the Pole Star is slightly distant from the north celestial pole. Two other points of reference in astronomical measurements are the zenith and nadir, these being the poles of the horizon. Another use of the word in geometry is to denote the point at which two tangents to a conic meet, this being called the pole of the chord joining the two points of contact. This chord is known as the polar of the point, and the theory of pole and polar is of great use in projective geometry, where their property of reciprocity often gives extremely pretty solutions to certain problems.

Pole, MAGNETIC. Those portions of the earth's surface to which the magnetic needle points are known as the magnetic north and south poles; they are not quite fixed in position, nor do they coincide with the ends of the earth's axis. The poles of a magnet are those portions of its surface at which lines of magnetic force leave the iron or steel; they are therefore the portions at which magnetic effects are apparent. That pole of a magnet which tends to point to the north is commonly known as its north pole, although, as unlike poles attract each other, it is clearly opposite in polarity to the terrestrial north pole. A magnet has usually two poles, but may have more—say, a north pole at each end and a south pole in the middle; the latter is in such a case called a consequent pole. Since a coil of wire acts as a magnet, it also has poles. If on looking at one end of a solenoid the current flow in the same direction as the motion of the hands of a clock, then the end looked at will be the south pole. The unit magnetic pole is defined as one of such strength that it repels an equal pole at a distance of one centimetre with a force of one dyne.

Pole, REGINALD, Cardinal and Archbishop of Canterbury, was of royal descent, and was born at Stourton Castle, in Staffordshire, England, in March, 1500. After a preliminary education at Sheen monastery, he entered Magdalen College, Oxford, and, after graduating, obtained much ecclesiastical preferment, though still a layman. He was immediately invested with various offices

by Henry VIII., who clearly destined him for the highest positions in the Church. Pole went to Italy, where he stayed some time, and on his return to England lived mostly in seclusion till 1529, when he was entrusted with the mission to Paris to obtain the sanction of the university there for the proposed divorce of Catherine of Aragon. Pole, however, was strongly opposed to the project, and all relations between him and the king were broken by his sending (1536) Henry in MS. a treatise *Pro Ecclesiastica Unitatis Defensione* (published in 1554), in which he attacked the king and condemned the threatened separation of England from Rome. Pope Paul III., being anxious to make him, to his dismay, a Cardinal, Pole took holy orders and became Cardinal on December 22nd, 1536, and next year was nominated Papal Legate to England. Henry retaliated by depriving him of his preferments and persecuting the members of his family, his mother, his eldest brother (Lord Montague) and several friends being arrested for high treason. The Pope sympathising with Pole and also alarmed for his own supremacy in England appointed the Cardinal to rouse the Continental powers against the English Reformation. Henry, meanwhile, executed his brother (1539); and later (1541) his mother, the Countess of Salisbury, was also led to the block. Pole tried to return to England after Henry's death, but was prevented. He is said to have been offered and to have declined the Papal throne in succession to Paul III. (1549). Not until the marriage of Queen Mary with Philip was he enabled to come to England as Papal Legate. He arrived in 1554, and the day after Cranmer was burnt was made Archbishop of Canterbury (March 22nd, 1557). He ruthlessly persecuted the Protestants and exercised his power unsparingly. His support of Philip against France, the Papal ally, led to his quarrel with Paul IV., who deprived him of his office as Legate and treated him very harshly. His death on November 17th, 1558—sixteen hours after Queen Mary's—is said to have been accelerated by this severity.

Polecat (*Putorius feticus*), a destructive and blood-thirsty nocturnal little animal of the Weasel



POLECAT.
(*Putorius feticus*.)

family, native in Great Britain and in Central and Northern Europe, of which the Ferret is a domesticated variety. The total length is about 18 inches, of which the tail counts for rather less than one-third. The fur is dark brown above and black beneath, and there are dark brown and white markings on the face. It feeds on small mammals, poultry, pigeons, such wild birds and their eggs as

come in its way, reptiles, amphibians, and fish. Holes in the ground or among faggots afford it protection in the summer, and in winter it finds shelter in outhouses or deserted buildings. Not content with satisfying its hunger and providing for its young, it often kills for the mere sake of killing. It is recorded that one slew as many as sixteen turkeys in a yard during one night. It has been suggested that it derives its name from the French *poule* and *chat* from the havoc that it plays with poultry. The creature is also known as the Fitchet or Fitchew. To the anal pouch, with its vile-smelling secretion, the animal owes its name of Fomart (the Foul Marten). Polecats pair in early spring, and the young—from three to eight in number, which are often trained for rabbiting—are born in April or May. The Siberian Polecat (*Mustela erermanni*), the Tibetan Polecat (*M. larvata*), the American Polecat (*M. nigripes*), and the Mottled Polecat (*M. sarmatica*), from Eastern Europe, the West of Asia, and Afghanistan, are closely allied.

Pole Star, or **POLARIS**, is the nearest star to the celestial pole, being, in fact, only about $1\frac{1}{2}^{\circ}$ away. This distance, however, is not constant, owing to the fact that the earth's axis does not remain absolutely fixed in direction. [PRECESSION.] On account of its small distance from the pole, it will be seen during the night to move in a very small circle about that imaginary point, a star

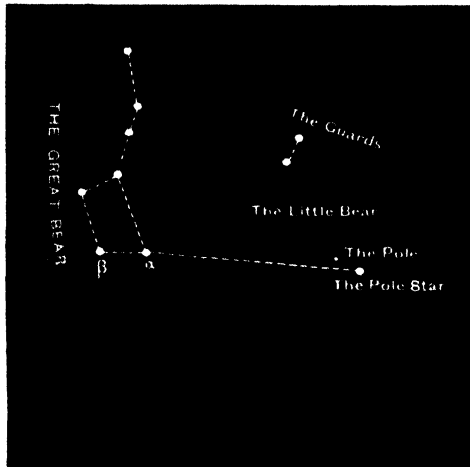


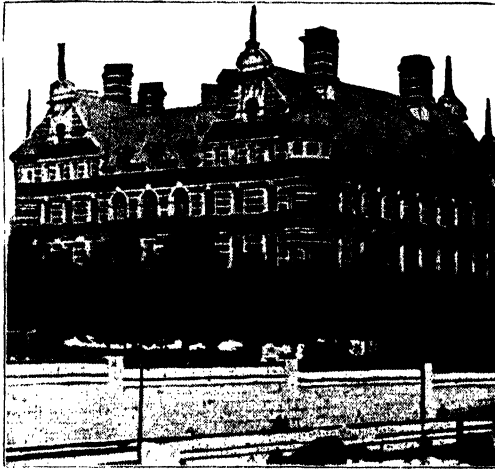
DIAGRAM SHOWING POLE STAR AND "POINTERS."

farther from the pole describing a correspondingly larger circle. Polaris is often used in determining the exact position of the celestial pole, which may be found by halving the distance between its upper and lower culminations. It is quite easy to find Polaris in the sky, for a line joining the two "pointers" of the Great Bear passes very nearly through it.

Police signifies (1) the judicial and executive functions of a society, and (2) an organised body formed with the object of preserving the public peace. The general features of the first of these characters are much the same in all civilised societies, but in details they differ much. Under Augustus the preservation of public peace within the city of Rome was in the hands of the *præfectus urbis*. In the palmy days of the French monarchy—for instance, under Louis XIV.—the police depended for its efficiency upon an elaborate system of espionage. The head of the police in France is the Minister of the Interior, to whom the *préfets* and *maires*, assisted by a huge body of commissaires and subordinates, are responsible. Under the ancient Saxon system in England the land was divided into hundreds, which were subdivided into tythings, and each division was responsible to that above it for the efficiency of its police arrangements. This system was supplemented by the institution of sheriffs, deputies, and a parish constabulary—an arrangement which lasted almost into our own time and produced the Charlies or watchmen in London and the City Guard in Edinburgh. In 1829 Sir Robert Peel—in compliment to whom the policeman obtained his popular *sobriquet* of "bobby" and "peeler"—introduced the modern metropolitan system and in 1839 counties were authorised, and in 1856 compelled, to adopt a similar system. In Scotland corresponding changes were introduced in 1833 and 1850, and a rural police in 1857. Ireland had been treated as an exceptional country, and its public peace has long been in the hands of a semi-military body, the Royal Irish Constabulary. The United States, in the general features of their police arrangements, have followed the mother country. Police forces exist in the cities, but in the country districts the arrangements are often at a much earlier stage of development than in England to-day. In London the control of the police within the jurisdiction of the Common Council—that is, in the area familiarly described as the City—is in the hands of a Commissioner appointed by the Council, but outside of this small area, that is, within the bounds of the metropolis, the police are under the Home Office. This has been regarded for a long time as a blot on the local self-government of London. The headquarters of the Metropolitan Police, including the detective branch of the force, are situated in New Scotland Yard.

Polignac, AUGUSTE JULES ARMAND MARIE, PRINCE DE, statesman, was born at Versailles, France, on May 14th, 1780. His parents were driven from Paris in 1789, being rigid Royalists. Polignac organised a conspiracy against Napoleon in 1804, which failed, and he was arrested and condemned to death, but was respited through the intercession of Josephine and suffered several years' imprisonment. On the restoration of Louis XVIII. he devoted himself to his service and was made a Roman prince by the Pope (1820). In 1823 he was appointed ambassador to the Court of St. James's and resided in England for six years, returning to Paris and assuming the position of premier

under Charles X. (1829). His arbitrary conduct led to his downfall and he fled, but was captured and again sentenced to death (1830), the sentence being commuted. He was banished, but afterwards allowed to return to France and died in Paris on March 2nd, 1847.



NEW SCOTLAND YARD, LONDON, FROM THE RIVER.

Photo : York & Sons, Notting Hill, W.)

Politian, otherwise ANGELO POLIZIANO, scholar and poet, was born at Montepulciano, in Tuscany, Italy, on July 14th, 1454, his real name being AMBROGINI. He was wonderfully gifted as a boy and some of his first writings are among his best. He was patronised by Lorenzo de' Medici and was enabled to study under the greatest scholars. Lorenzo made him tutor of his son and keeper of his manuscripts and books, allowing him to live with him. Even after he had had a serious dispute with the household, he was still sheltered by Lorenzo. At twenty-nine years of age he was professor of Greek and Latin in the University of Florence and his reputation was so high that pupils and admirers came from all parts of Europe to attend his discourses. He was, however, of such an irritable and vain temper that he was constantly quarrelling with other scholars, Michael Angelo being of those with whom he was at enmity. Politian published many learned works, but his poems are the best known of his writings and include *Manto*, a panegyric of Virgil, *Ambra*, an idyll of Tuscan landscape (introducing his eulogy of Homer), *Rusticus*, a warm laudation of country joys, and *Nutricia*, a prefatory consideration of ancient and modern poetry. He translated various Greek writers (such as Epictetus, Galen, Herodian, Hippocrates, Plutarch's *Exoticus* and Plato's *Charmides*) into Latin, including a version of the *Iliad*, which has been lost. His philological and critical essays, published in 1489 under the title of *Miscellanea*, attained immediate fame and set an

example which the learned professors of other lands hastened to emulate. His *Orfeo* (acted in 1483) was the first of Italian operas. He died in Florence on September 24th, 1494.

Political Economy. The Greek word *oikonomia* means the art of managing a household and its means of subsistence (Aristotle, *Politics*). Political economy was originally conceived of as the same sort of art applied to the resources of a state. Even Adam Smith says that "it proposes to enrich both the people and the sovereign"; but the scientific treatment of the causes of wealth, on which such an art must be based, was so developed by him and by subsequent writers that the name has come to be used for the science dealing with the general laws of the production, distribution, accumulation, and exchange of wealth, which is most conveniently defined as "material things having an exchange value."

History. The society conceived of by Aristotle as the best possible was a uniform, stable society of well-to-do households, in which agriculture would be the chief source of wealth; slaves would do most of the work and manufacture and exchange would be comparatively limited. There would be no lending at interest and, of course, no finance. Values and prices would vary very little, and the few free labourers that existed would receive a regular wage. Moreover, all wealth-getting would be limited by the needs of a "good life." In such a society there would be little scope for the study of economic phenomena, though some of the simplest were dealt with by Aristotle; and the society conceived of by mediæval philosophers is much of the same kind, only that slavery has disappeared and the morally good life has become the Christian life. With the rise of great warlike monarchies towards the end of the Middle Ages we get the notion of such an art as that defined by Adam Smith (*see* above). The form it then took was the Mercantile System. Gold and silver being the handiest form of wealth, a state, which must always be prepared for war, should try to secure as much of them as possible. The most effectual way to do so was to sell manufactured goods to foreigners for specie; and hence under Louis XIV. elaborate efforts were made in France to improve manufacture. [CORTBERT.] In reaction against the restrictions this involved, the Physiocrats argued (wrongly) that manufacturing was only transforming, not creating, wealth, which had its true source in agriculture; and that the true policy was "Laissez faire, laissez passer." [LAISSEZ FAIRE.] Following them, Adam Smith attacked the Mercantile System much more elaborately, employing in the process both economic history and abstract reasoning, and from him dates the science proper. Adam Smith's successors—coming at a time when deductive reasoning was in fashion and society was commonly regarded simply as a collection of individuals naturally free and united under contract—created a science dealing with wealth and man as a wealth-producer in the abstract, so that its conclusions frequently do

not correspond to actual fact. Schools have, therefore, arisen (especially in Germany) which insist that the science can only be studied by observing the facts of history and society. It may, however, be answered (as it was substantially by John Stuart Mill) that, without some such provisional conclusions as the "abstract" science gives us, we should be lost in the maze of economic phenomena. It would be hopeless to study the Irish land question or the fluctuations of silver without some preliminary notion of the general causes affecting rent and value. Partly in reaction against the "historical" schools, the abstract side has even been treated as a branch of the higher mathematics (especially in Austria) in a manner far too abstruse for description here. But it is well to remember that the definitions as ordinarily accepted are only provisional, and in part arbitrary, and that the deductions express rather tendencies than actual facts. Thus the abstract schools assume a society composed of free men knowing their own interest, and each competing with his fellows to get as much wealth as possible, by producing wealth or rendering services and selling that wealth or those services to the best possible advantage to himself. The assumption, though true in great part of modern commercial society, is comparatively remote from uncivilised or backward societies, but the deductions can easily be corrected by a study of the actual facts. Unfortunately, this correction has often been neglected; hence, in part, the outcry against economics as hard-hearted and selfish. Moreover, as the science deals only with one set of the phenomena of society, other sets have to be taken into account in suggesting remedies for social ills. It is because abstract political economy alone is insufficient for this purpose that it has been called "the dismal science."

Divisions. Political economy deals with the production, distribution and exchange of wealth. Exchange, however, and value are its cardinal facts. Under production and distribution (inasmuch as in the United Kingdom wealth may roughly be said to be divided between three conspicuous classes—landlords, labourers and capitalists), it deals respectively with land, labour and capital, as requisites of production, and with rent, wages and profits as the share accruing to each. These divisions are admittedly unscientific, but have not yet been quite displaced. Under exchange, it deals with the causes and nature of value and with the mechanism of trade, as money, credit and banking; and some textbooks deal also with taxation, since the goodness or the badness of the system adopted has great effect on the national wealth, or with the influence of government in general on that wealth. It must be remembered, however, that pure theory and descriptions of facts are often not clearly separated in the textbooks; that the assumption of free individual competition is not true at all of many stages of society, and is still greatly modified by custom, and at present especially by the growth of joint stock companies, by "trusts" and "rings" to control markets, and by trades unions; and that most of the conclusions are of necessity limited in their application; but this latter objection might be made to most branches

of applied science, such as engineering or pathology. [RENT, BANKING, BIMETALLISM, FREE TRADE.]

Politics, in a large sense, comprises the science and art of government, and deals with all the relations of a man with the society of which he forms a unit. Now, though this general interpretation is not ignored, the term is mainly used to signify (1) the carrying on of the relations of one civilised society with another, and (2) the due appointment of legislative and executive functions, the settlement of the rights and privileges of the members, within a community itself. Hence we get the great divisions of foreign and home politics. By analogy the term is used in narrower senses still. Thus we meet with the terms "Church politics," "county politics," "village politics," and the like.

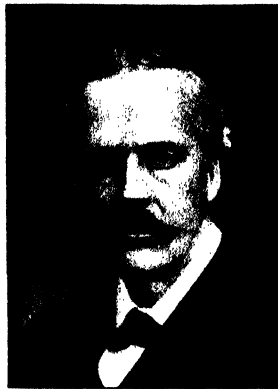
Polk, JAMES KNOX, eleventh President of the United States, was born in Mecklenburg county, North Carolina, on November 2nd, 1795. He was the son of a well-to-do farmer whose family name was originally Pollock. He received a fairly good education in early youth and was destined for a commercial career, but he expressed such a distaste for it that his father allowed him to enter North Carolina University, in Chapelhill, where he graduated in 1818. He studied law and in 1820 was admitted to the bar of Tennessee, of which state he became governor in 1839. He entered Congress in 1825 and remained a member for fourteen years, during which period he was several times Speaker. In 1844 he was elected President of the United States—the rival candidate being Henry Clay—and his rule is notable as that in which the annexation of Texas and California was carried out. His private life was blameless and he was known as a stickler for punctuality, regularity and habits of industry. He died at Nashville, Tennessee, on June 15th, 1849.

Polk, LEONIDAS, bishop, was born at Raleigh, North Carolina, United States, on April 10th, 1806, and was educated at North Carolina University and the Military Academy at Westpoint, where he graduated in 1827. Being induced to study for the Church, however, he was ordained priest in 1831, became rector of St. Peter's, Columbia, in 1833 and, in 1838, was appointed Bishop of Arkansas and Indian Territory, with provisional charge of the dioceses of Alabama, Mississippi and Louisiana, all of which, excepting the last-named, he resigned in 1841. During several years he was actively engaged in promoting the Episcopalian University of the South, finally founded at Sewanee in Tennessee. During the Civil War he espoused the Secessionist side and was appointed major-general in 1860. He fought through various battles and gained several victories, but was killed at Pine Mountain, in Georgia, by a cannon-shot whilst reconnoitring, on June 14th, 1864.

Polka, a lively round dance which originated in Bohemia in 1830 and was introduced in 1843 into England, where it at once became popular. It is in duple time and, generally, there is an accent on the second beat of the bar. It maintained its



R. Haines, phot.
MR. H. H. ASQUITH.



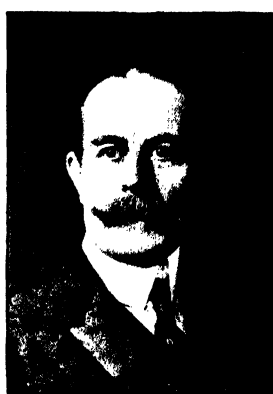
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MR. A. J. BALFOUR.



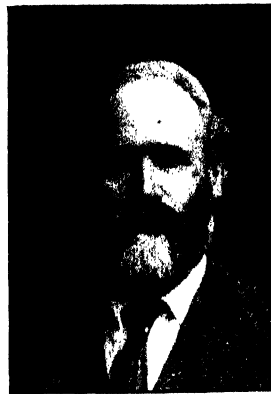
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EARL OF CREWE.



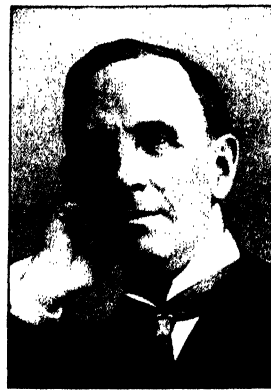
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VISCOUNT MORLEY OF BLACKBURN.

POLITICS.

vogue for nearly half a century, when it suddenly ceased to be fashionable. Apparently it was unable to withstand the general craze for the waltz. The polka mazurka is a blend of two dances. The mazurka, invented by the Mazurs, natives of Mazolia in Poland, was devised for four or eight pairs of dancers. Its steps and figures were various and sometimes improvised and originally it was danced to a vocal accompaniment. The modern mazurka is a polka with two sliding steps instead of one, the music being in triple time.

Pollack (*Gadus pollachius*), a fish of the Cod family, found in the northern seas of Europe and sometimes in the west Mediterranean. It is active of habit; the lower jaw is longer than the upper and the chin has no barbel, points distinguishing it from other species of the genus; it often runs to twenty-five pounds in weight and may reach a length of three feet, though lighter and shorter specimens are commoner. It shows great determination in the pursuit of prey. Couch mentions the case of a young Pollack only five inches long which persecuted a small whiting that had taken shelter within the cavity of a medusa. The victim might have escaped had not several other Pollacks joined in the hunt. In despair the whiting rushed to the surface where, exhausted, it lay as if dead, drifting with the tide. When it recovered strength it once more took refuge in the medusa, but the Pollacks routed it out and killed it. This seemed to glut their ire, for they left the carcass unconsumed. In Scotland and Ireland the Pollack is called Lythe.

Pollaiuolo, ANTONIO DI JACOPO BENCI, surnamed, goldsmith, painter and sculptor, was born at Florence in 1429. He was the first to dissect the human body for artistic purposes. He was an admirable modeller, and about 1452 was working as a goldsmith in his native city, where he executed some of the details in one of the portals of the Baptistery. He is best known as a painter, his "Saint Sebastian," one of his best works, being in the National Gallery in London. He died at Rome in 1498. His brother, PIERO POLLAIUOLO (born in Florence, 1443; died, 1496), was a painter of considerable repute. His best works are a "Coronation of the Virgin," an altar-piece of a "Three Saints" and "Prudence."

Pollan (*Coregonus pollan*), a freshwater fish of the family Salmonidæ. It is remarkable for the shortness of its head and the depth of its body and has the appearance of the herring, which it also resembles in its gregarious habits. It is ten or eleven inches long and is caught in great numbers in Lough Neagh, in Ireland, where it is esteemed for its excellent flavour. The Powan of Loch Lomond, the Vendace of Lochmaben in Dumfriesshire, and the Gwyniad of certain Welsh lakes and Ullswater in Cumberland—all freshwater—are nearly-related varieties of the species.

Pollards, trees, especially willows and poplars, that have been polled or cut back to the trunk. The effect of such treatment is twofold: in the first place, all the vigour is thrown into the stem and

the tree thenceforward is of stunted growth and, secondly, there grows from the truncated head a dense mass of spreading branches which are cut off periodically to be made into baskets or used for faggots. Pollarding is performed every three or four years. Trees that are included for this treatment are generally planted by the banks of streams or in lush meadows and present an appearance that, if ugly, is also striking. Oaks are sometimes pollarded for the sake of the bark.

Pollen is the special name of the microspores of Phanerogamia. It consists generally of minute yellow dust-like pollen-grains, each of which is a microspore formed from a single cell, one of four daughter-cells resulting from the division of a pollen mother-cell. Sometimes, from the non-solution of the wall of the mother-cell, the grains remain connected. In different divisions of the Orchidaceæ all gradations occur from isolated grains, through tetrads or groups of four, to pollinia or pollen-masses, in which all the grains of each anther-chamber are united. The wall of the ordinary pollen-grain becomes differentiated into an outer cuticularised exospore, exine or extine, and an inner cellulose intine. The former often projects in spiny points, ridges, etc., and the latter is locally thickened inwards. In Gymnosperms the pollen-grain divides into two unequal cells, of which the larger grows out into the pollen-tube on pollination and the smaller commonly divides into several included cells, the male prothallium. In pines the exine is distended into air vesicles. In Angiosperms the grain similarly divides into two primordial or wall-less cells, from one only of which the pollen-tube is formed when the grain reaches the stigma. Several pollen-tubes may issue from one grain, each being a projection of the intine, rendered possible by the above-mentioned thickening. The contents of the grain do not form antherozoids, as in the microspores of Cryptogamia, but two nuclei pass into the tube. The exine is sometimes sticky from an oily exudation.

Pollination is the conveying of the pollen from the anthers to the tercelle or nucleus in Gymnosperms or the stigma in Angiosperms, where it is detained by viscidinity. Pollination may be effected by wind, as in the anemophilous flowers of Coniferae, hazel, etc.; by insects, as in more showy, coloured, variegated, odorous, or honey-secreting entomophilous flowers; or, more rarely, by birds, slugs, beetles, or running water. It may precede fertilisation by a few hours, or, as in conifers, by months. [FERTILISATION.]

Pollio, CAIUS ASINIUS, orator, poet and historian, was born in Italy in 76 B.C. In 54 he impeached Cato the younger, though without success, and had distinguished himself before the civil war broke out between Julius Cæsar and Pompey. He espoused Cæsar's cause and, after his death, sided with Mark Antony, who named him consul (40). He reconciled Augustus and Antony, was known to Horace and Virgil, who dedicated poems to him, and retired from public life after his victory over the Dalmatians. He founded the first

public library in Rome. He wrote tragedies which Virgil pronounced to be worthy of Sophocles, a history of the civil wars of his time, and was a severe literary critic. Of his writings nothing has survived beyond three letters to Cicero and a few fragments of his speeches. He set the example, afterwards generally followed and said not to be unknown even in the present day, of reading his writings to an audience of friends. He died in his villa at Tusculum, about 12 miles south-east of Rome, in A.D. 4.

Pollock, SIR FREDERICK, judge, was born in London, on September 23rd, 1783. He was educated at St. Paul's School, and afterwards entered Trinity College, Cambridge, where he graduated as Senior Wrangler in 1806. Studying law, he was called to the bar in 1809, and for twenty years practised with great success in London and on the Northern Circuit. He was made a king's counsel in 1827, and was elected member of Parliament for Huntingdon in 1831. He was appointed Attorney-General in 1834, when he was knighted. In 1841 he again became Attorney-General, and three years later was made chief baron of the Court of Exchequer and a privy councillor. In 1866 he retired and received a baronetcy. He was one of the most distinguished ornaments of the English bench during the 19th century; his decisions were as clearly expounded as they were generally sound. Few lawyers possessed in such a high degree the gift of lucid expression. He died at Hatton in Middlesex on August 23rd, 1870.

Pollock, SIR FREDERICK, publicist, eldest son of Sir William Frederick Pollock, was born in London on December 10th, 1845, and was educated at Eton (King's Scholar) and Trinity College, Cambridge, where, in 1868, he obtained a fellowship. In 1871 he was called to the bar at Lincoln's Inn and became Professor of Jurisprudence at University College, London, in 1882; Corpus Professor of Jurisprudence at Oxford in 1883, and Professor of Common Law in the Inns of Court, in 1884. In addition to several valuable legal works (*Principles of Contract*, 1876; *The Law of Torts*, 1887; *Digest of the Law of Partnership*, 1877, and others), he is the author of *Spinoza: his Life and Philosophy*, 1880; of the Chapter on the *Early History of Mountaineering* in the Badminton volume, 1892; and is part author of the celebrated "*Etchingham Letters*," 1899. He was named Fellow of the British Academy in 1902. Sir Frederick succeeded his father, the second baronet, in 1888.

Pollock, SIR GEORGE, field-marshal, son of David Pollock, saddler to George III., whose three sons all became distinguished men, was born in Westminster on June 4th, 1786, and, after studying at the Royal Military Academy, at Woolwich, entered the service of the East India Company, becoming a lieutenant of artillery in 1808. In August, 1804, he engaged in active service at Cawnpore under Lake, against Holkar, but the British force was compelled to retire to Agrā as

Holkar was advancing with ninety thousand men. By October, Lake was prepared to meet the enemy and eventually Holkar was defeated and Pollock was promoted captain-lieutenant. He received command of the artillery of a field force ordered to pursue Holkar who, a fugitive, sued for peace. In the first Burmese war, 1824, he was ordered to the front, but arrived after Rangoon had fallen. He commanded the artillery of General Cotton's division and for his services at the bombardment and capture of Mallow and subsequent actions was made C.B. and promoted brevet-colonel, 1829, and became major-general in 1838. In January, 1842, the British troops in the Khyber Pass were annihilated and Pollock was selected for the command of the expedition sent to relieve Sir Robert Sale and his troops at Jelalabad. Reducing his baggage to a minimum and cautiously preferring delay to any unpremeditated action, he slowly and steadily forced the terrible Khyber Pass. On April 16th the band of the besieged sallied forth to play the relieving force into the town. In order to rescue the British detained by Akbar Khan, Pollock and General Nott resolved to push on to Kabul, before withdrawing from Afghanistan in pursuance of Lord Ellenborough's policy. After many desperate encounters their efforts were successful. Pollock ordered his chief engineer to destroy the bazaar in Kabul where the head and mutilated remains of Sir William Macnaghten, the British envoy, had been exhibited, and he afterwards brought his troops safely back to India in spite of the desperate hostility of the hill tribes. He was made G.C.B. and appointed political resident at Lucknow and, later, military member of the Supreme Council of India. Ill health compelled his return to England in 1846. He was gazetted field-marshal in 1870, appointed Constable of the Tower in 1871, and created a baronet as "of the Khyber Pass" in 1872. He died at Walmer in Kent, on October 6th, 1872, and was buried in Westminster Abbey.

Pollock, ROBERT, poet, son of a small farmer, was born at North Moorhouse, Renfrewshire, Scotland, on October 19th, 1798. He was educated at a neighbouring farmhouse and at Mearns parish school, where his health was injured by excessive athletics. Starting life as a cabinet-maker and then joining his father on his farm, he and an elder brother decided to prepare for the ministry. They went to Glasgow University where Robert graduated in 1822 with distinction in logic and moral philosophy. Reading widely, he wrote verse, founded a literary society and under Dr. Dick continued the study of theology at the United Secession Hall. On May 2nd, 1827, he became a probationer under the United Association Synod and preached four times. But his health was undermined and the doctors recommended a visit to Italy. With his sister he went to London by sea, where it was seen he was unfit to pursue the journey. They settled at Shirley Common, near Southampton. The milder climate failed to benefit him and he died of consumption on September 18th, 1827, being buried in the neighbouring churchyard of Millbrook. While still a divinity student he published

anonymously, in a time of need, a series of *Tales of the Covenanters* and planned his chief work, *The Course of Time*, in ten books of blank verse, which Professor John Wilson ("Christopher North") considered "though not a poem, overflows with poetry." Its subject is man's spiritual life and destiny; its inspiration the *Shorter Catechism*. As it set forth the favourite Calvinistic tenets of the period, it appealed to the seriously-minded and at once became popular. The unfortunate poet died within six months of its appearance, and the interest aroused by it led to his memoir being written by his brother. His admirers erected a granite obelisk over his grave on which is inscribed "His immortal Poem is his monument."

Pollokshaws, a town on the White Cart, Renfrewshire, Scotland, practically a suburb of Glas-

Polo, an equestrian game of hockey, was practised from a remote antiquity in the East, and was introduced into Calcutta by British officers in 1863. It has now been generally adopted among British communities. The polo-ground should be of turf, 300 yards by 200 yards, with goals at each end 24 feet apart. The ponies used should not be more than 14·2 hands high, nor the players more than four a side, consisting of 1, 2, 3, and back. The polo-stick—four feet long—is of light cane, with a cross-head eight inches long, and the ball is of light wood. A player is not allowed to cross the front of his opponent. A match usually lasts one hour, divided into periods of ten minutes each, when the ponies are changed. Good Polo is played at full gallop throughout. The best ponies, which must be thoroughly trained to the game, are obtained by crossing thoroughbreds with mares having some



POLO: HITTING A GOAL, HURLINGHAM.

[Photo: Pictorial Agency.]

gow from which it is about three miles distant to the south-west. It is familiarly called the Shaws, its name meaning the woods of Pollok, an adjoining estate which was granted by David I. about 1124 to Walter the High Steward of Scotland and afterwards passed to the Maxwells. The chief buildings are the town house, public hall (presented by Sir John Stirling Maxwell) and the Early English parish church. The industries include textiles, bleaching and printing, dyeing, paper-making and iron-founding. A cotton-mill, built towards the end of the 18th century, was the first in Scotland to be lighted with gas. Tanning (especially of chamois leather), Turkey-red dyeing and calico-printing, once vigorously conducted, have declined. Pop. (1901), 11,169.

Poll Tax was a tax of the Middle Ages, which, as its name implies, was levied upon each member of the community. In England it amounted to three groats upon all over 15 years of age, and was a most unpopular tax. It was levied in 1377 and in 1380, and in 1381 the arbitrary conduct of those to whom the tax was farmed out caused many disturbances, notably that of which Wat Tyler was the moving spirit. William III.'s hearth tax, the window tax of a later period, and the income tax of our own time are the nearest modern counterparts, none of which was generally acceptable.

Arab, Welsh, or Exmoor blood. Tournaments are held at Hurlingham, Ranelagh, Rugby and elsewhere in England. In the United States individual excellence counts for more in a match than in England where combination is the invariable rule. English practice is preferable. Owing to the climate a match in India lasts only 40 minutes.

Polo, MARCO, traveller, was born in Venice, probably about 1254, shortly after his father Nicolo and uncle Maffeo had gone on a voyage to the East. They were away for many years and visited Kublai, the Tatar Emperor of China, or Groat Khan. He was interested in their stories of Europe and, in order to ingratiate himself with the Pope, of whose power he had heard, entrusted them with a mission to him, requesting that a hundred learned men might be sent to China to convert its people to Christianity. They returned to Italy after many years' absence and found Marco grown up. Owing to internal dissensions, the Papal chair was vacant and it was not till 1271, when Nicolo and Maffeo had set out for the East again, taking Marco with them, that they heard of the election of the new Pope, Gregory X., who, however, instead of the desired hundred missionaries, nominated only two Dominican monks who declined the journey. The party reached China, loaded with presents for the Khan, who gave them a royal reception. Marco Polo

became a favourite with Kublai, who sent him on various embassies. At length the travellers found an opportunity of returning to their native country. They were appointed to escort the Khan's granddaughter to Persia, where she was to marry a young prince, and promised to return; but the voyage proved so tedious that the prince was dead before they reached him. Feeling absolved from their promise by the death of the Khan, they went to Italy, where they arrived in 1295, with the enormous wealth they had amassed. In Venice they were regarded as wonders. Marco Polo was made commander of a galley in an expedition against the Genoese and, being defeated (1298), was imprisoned in Genoa. Here he wrote the marvellous story of his travels in the East, giving glowing descriptions of the magnificence of its potentates and of the people. He was liberated and returned to Venice, where he died in 1324. Many of his extraordinary statements were scoffed at in his day, but time has proved their truth. It was the reading of his *Description of the World's Wonders* which inspired Columbus to seek a new world. Polo's travels have often been edited and translated.

Polyandrous, literally "having many male organs," or stamens, applied strictly to those flowers in which there are twenty or more stamens, with insertions on the receptacle (thalamifloral), as in the Ranunculaceæ, poppies, water-lilies, mignonettes, rock-rose, linden, etc. Where there are a similar number with "calycifloral" insertions [ROSACEÆ], they were termed in the Linnæan arrangement icosandrous.

Polyandry, the condition of having more than one husband at the same time. The custom probably originated in unfertile regions in which, owing to the scanty means of subsistence, it had become essential to limit population. It prevailed long ago in certain districts in Europe and is still practised in Tibet, parts of India and Ceylon, among some tribes of Pacific Islanders and the lower races of North and South America.

Polyanthus, a garden name, meaning "many-flowered," applied to those cultivated varieties of the primrose in which the peduncle is elongated bearing up a whole umbel of flowers, as is normally the case in the cowslip. The flowers are variously and beautifully tinted, often having a broad circular band of red or brown, with a yellow centre or "eye," and sometimes an edging or "lacing" of a different shade. They are old-fashioned cottage-garden favourites.

Polybius, historian, was born at Megalopolis, in Greece, possibly in 204 B.C., though the date can only be conjectured. He was the son of Lycortas the statesman and descendant of the great patriot Philopœmen, whose ashes he conveyed home after the hero's death in Messina (182). He became connected with politics in his youth and was one of the thousand hostages carried off by the Romans after the conquest of Macedonia in 168. He formed the acquaintance of Scipio, the destroyer of Carthage, who aided him in his historical studies. Polybius

returned to Greece in 151, and soon afterwards was again with Scipio, returning finally after the Romans had suppressed the Achæans' noble effort for freedom. He died at the age of 82, probably in 122, in consequence of injuries sustained in a fall from his horse. Though he has been reproached with deserting his country, it is certain that Polybius rendered it invaluable service on account of his influence with the Romans. His great work is a history of Greece and Rome between 220 and 146 in forty books, of which only five remain, the rest being fragmentary. It is accurate, impartial, and admirably written and has been often translated.

Polycarp, SAINT, martyr, was born in, or before, A.D. 69, though the actual date is unknown. He was instructed in the Christian religion by the Apostles themselves and became attached to John the Evangelist, who made him Bishop of Smyrna in 96. There is nothing known of St. Polycarp's early life or of his personal history, but he was probably born in Asia Minor. He ruled his see for many years and received St. Ignatius when the latter journeyed from Antioch to Rome. In the year 158, then a very old man, he went to Rome to confer with Pope Anicetus about the celebration of Easter Day. He objected to the Western practice of holding it on the anniversary of the Resurrection, but the result of the conference was simply to leave the East and West to their former methods of celebration. While in Rome Polycarp converted many of the followers of Marcion and Valentine from their heresies. He was held in the highest reverence by Christendom and was considered head



POLYANTHUS

of the Asiatic bishops. He held the see for seventy years and at length was ordered to be burnt by the Roman Governor for refusing to renounce Christ. His reply was, "Eighty-and-six years have I served Him, and He never did me wrong, and how can I betray my King who saved me?" His bones were gathered by his disciples and preserved. The record of his martyrdom—which happened possibly in 166 or 167—is to be found in the letter from the

Christians of Smyrna to the church of Pontus. His beautiful *Epistle to the Philippians*, though its authenticity has been disputed, is a noble relic of the times. His day is the 26th of January. Irenæus was one of his pupils.

Polychæta, the order of worms including those members of the class Chætopoda or bristle-bearing worms which have numerous setæ or bristles. These bristles are united into bundles and placed on lateral processes of the body known as parapodia. In addition to these, there are other lateral appendages—the cirri and branchiæ—which are mainly concerned in respiration. The Polychæta are all marine. The order is subdivided into the Errantia, which are free and carnivorous; and the Tubicola, which live in tubes that are usually fixed, while the animals feed on vegetable matter. As examples of the former may be cited Aphrodite, or the Sea-Hare, and the centipede-like worms, Nereis, Phyllodoce, etc.; of the latter there are the Lob-worms (*Arenicola*), which live in burrows in sand, and Serpula or Spirorbis, which form calcareous tubes.

Polycistina, a name often used for those Radiolaria which have a silicious shell. Their silicious skeleton, generally globular, is variously trolised and sometimes composed of two or even three concentric balls, supported and separated by few or many long radiating spicules, passing from the centre to beyond the surface.

Polycladida, a family of flat, leaf-shaped worms, with much-branched intestines, belonging to the order Dendrocoelida and the class Turbellaria. They are all marine and of peculiar interest, as they are supposed to have possible affinities with the Jellyfish belonging to the class Ctenophora. This view is based on the position of the auditory organ and of some bands of cilia in some Polyclads. The structure of the excretory and nervous system is, however, opposed to such a view.

Polycleitus, sculptor, who flourished in the 5th century B.C., was born probably at Sicyon, 9 miles north-west of Corinth, but resided in Argos. He was one of the most illustrious sculptors of the ancient world and, just as Peloponnesus rivalled Athens in politics, so Polycleitus enabled it to rival it in art. In the grand manner he was inferior to Pheidias, who was supreme in rendering god-like majesty, but he excelled him in purity of style and the finish of his execution. Polycleitus's strength lay in his statues of young athletes, in which he was incomparable. His "Doryphorus," a youth bearing a lance, was considered to set the canon in this branch of sculpture, in respect both of proportions and principles. This and his "Diadumenus," in the British Museum, were his masterpieces.

Polycrates, tyrant of Samos, made himself master of that island (in the Greek Archipelago, 42 miles south-west of Smyrna in Asia Minor) about 532 B.C. Having put to death or otherwise removed those who helped him to power, he began to extend his dominion, endeavouring also to render it

impregnable. Although on friendly terms with Amasis, the Egyptian king, he sent troops to the aid of Cambyses, who was invading Egypt (525); but the intended reinforcements, co-operating with Spartans and Corinthians, laid siege to Samos in the hope of effecting Polycrates' ruin. They failed, but he was eventually betrayed by one of his enemies, the Persian Oroetes, who, by false pretence, enticed him out of Samos to Magnesia in Asia Minor, where he was captured and crucified (522). Polycrates was a patron of art and literature, Anacreon being one of those befriended by him.

Polygamous, in botany, signifies "having flowers both perfect and imperfect [*i.e.*, bisexual and unisexual] on the same plant," as in the ash, the maples, horse-chestnuts, and most Composite. The horse-chestnut illustrates a common principle, the lower or first-formed flowers being bisexual, or having both stamens and carpels; while the upper, later-formed ones are male, *i.e.*, staminate. In the Composite various arrangements occur, the most frequent being that in the daisy, where the centre or disc florets in each head are bisexual, and the outer or ray florets are female, *i.e.*, pistillate.

Polygamy, though generally restricted to the kind of marriage in which one man has many wives, should also include Polyandry, in which one woman has many husbands. [FAMILY, MARRIAGE.] In Africa and the East polygamy, in the strictest sense, is still prevalent; and by the Koran (chapter iv.) a man is permitted to have four wives. In Old Testament times a plurality of wives seems to have been the rule. Lamech (Gen. iv. 19) had two; and the maximum was probably reached by Solomon (1 Kings xi. 3). One finds no word of reprobation as to the enormous number; his blameworthiness seems to be due to the fact that they were "strange women." Probably, as in the harems of Eastern potentates at the present day, the vast majority were wives in name only, some few favourites sharing the affection of their lord. Christianity condemns polygamy, though in the religious upheaval of the 16th century some of the chief German Reformers sanctioned it in a particular case (that of the Landgrave of Hesse). Polygamy was distinctly advocated as a remedy for prostitution by the Rev. Martin Madan (1726-1790), who in 1780 published *Thelyphthora: or, a Treatise on Female Ruin*, to spread his views. This drew from William Cowper, the author's cousin, a poem entitled *Anti-Thelyphthora*, which Canon Benham justly calls "a wretched production." [MORMONS, BIGAMY.]

Polyglot (Greek, "many-tongued"), a book containing, arranged in parallel columns, versions of the same text in several different languages. For obvious reasons the most important polyglots are those of the Bible. The first undertaking was the *Hexapla* of Origen—which, however, exhibited only two tongues (Hebrew and Greek) and the versions of Aquila, Symmachus, Theodotion and the Septuagint. The first that displayed the text in several tongues was called the Complutensian, because it was published (1522) at Complutum, the Latin name

for Alcalá de Henares in Spain, where, during the five previous years, Cardinal Ximenes had promoted and directed the work. Then came the Antwerp Polyglot (1569-72) under the patronage of Philip II. of Spain and printed by Plantin. Next followed the Paris Polyglot of Le Jay (1645), a beautiful example of typography. Finally the *Biblia Sacra Polyglotta* (1657) of Brian Walton, Bishop of Chester may be cited as the most complete of such enterprises.

Polygon, any figure whose sides are straight lines; when these sides are all equal and include equal angles, the polygon is said to be regular. All regular polygons can be circumscribed about and inscribed in a circle, but the problem is not always easy of solution. Euclid devised methods for performing the operation with polygons of 3, 4, or 5 sides; and hence the method can be applied to cases where the number of sides is 3, 4, or 5 multiplied by any power of 2. Gauss gave solutions for polygons of a more complicated type. All polygons of an even number of sides, if circumscribed about a circle, have the sums of the odd and even sides equal; and, if inscribed in a circle, the sums of the odd and even angles are equal. The sum of the angles of any polygon is equal to four less than twice as many right angles as the figure has sides.

Polygon of Forces, a polygon of which each side represents in magnitude and direction one of a number of forces acting on a point. When the forces are in equilibrium, the polygon is complete.

Polygordius, the type-genus of the family Polygordiidae, and the best-known member of the class of primitive worms that are called Archi-Annelida. It is a small marine worm, with the segmentation very feebly marked; they have neither bristles (setæ), nor lateral appendages (parapodia), nor the respiratory processes known as cirri and branchiæ. The intestine is straight and the kidneys (nephridia) are also very simple. The fact that the nerves are retained in the hypodermis is another very primitive character. There are several species which are common in the Mediterranean; when irritated, they break voluntarily into fragments.

Polyhedron, a solid figure bounded by plane surfaces. If its faces are all equal and regular polygons, it is said to be a regular polyhedron, and it can be shown that only five such can exist—i.e., the tetrahedron (four faces), cube (six faces), octahedron (eight faces), dodecahedron (twelve faces), and icosahedron (twenty faces). The prism and pyramid are common examples of irregular polyhedra. A connection between the number of faces, edges and vertices of any polyhedron is given in Euclid's theorem, which states that the sum of the number of faces and vertices is two more than the number of edges.

Polyhymnia (Greek, "she of the many hymns"), one of the Nine Muses, daughter of Zeus and Mnemosyne. She was especially the goddess of lyric song and the sublime hymn, her attributes being afterwards extended to embrace learning

and the faculty of remembering. By some she was held to be the inventor of harmony and the lyre, and towards the close of the Roman empire was regarded as the patroness of mimes and pantomimes.

Polymerism. Many chemical compounds exist which possess similar percentage composition, but which contain different numbers of the constituent atoms in their molecules and hence possess different molecular weights and different vapour densities; such compounds are said to be polymeric. As examples, may be cited the class of compounds known as olefines, all of which possess the same percentage composition (i.e., C 92.3, H 7.7), but which vary in their molecular weights from 26 (C₂H₄) to 420 (C₃₀H₆₀). Many compounds, especially a number of hydrocarbons, if allowed to stand (particularly if warm), polymerise and pass into these higher compounds.

Polymorphism, the modification of different members of a colony into very different forms, whereby a division of labour is secured to the colony. Thus, in the common Sea-firs or Sertularia, some of the individuals which form the colony are specialised for the capture and digestion of food and others for reproduction; the former are known as hydrothecæ and the latter as gonothecæ or gonangia. As in this case there are only two modifications, it is known as dimorphism; in others it is more complex. Thus, in the Physophoridae, some individuals form the feeding members or "poly-pites;" others form a "pneumatophore" or float; a third set serve as protective plates or "hydrophyllæ;" a fourth, the feelers or "hydrocysts;" a fifth, the male reproductive organs or "androphores;" and a sixth, the female or "gynophores." Polymorphism is especially characteristic of the Coelenterata, as in the Sponges, Sea-firs, and other zoophytes, and the Alcyonarian corals. Amongst higher animals, it occurs in the order Cheilostomata of the class Bryozoa, where the individuals that serve for feeding and digestion, for reproduction (oöcia) and protection (avicularia) are all modified zoöcia.

Polynesia (sometimes called OCEANIA) in its widest sense includes all the islands of the Pacific east of Australia, New Guinea and the Philippines, excepting Japan, the Kuriles, the Aleutians, the isles of Bering Sea, and the islands off British Columbia, Mexico, and South America. These, again, are classified into MICRONESIA, which includes the islands west of 180°, and north of the Gilberts and the Equator; MELANESIA, which includes the islands south of the Equator and west of 180°, and north of the tropic of Capricorn; and POLYNESIA PROPER, which includes New Zealand, the Ellice Archipelago and the islands east of 180°, and north and south of the Equator. This last division, which is also known as EAST POLYNESIA, is the area occupied by the race strictly called Polynesian. These oceanic islands are either coralline or volcanic and show great uniformity in climate and biology. The flora embraces cocoa and other palms, bread-fruit, pandanus, yams,

taro, sweet potatoes, araucarias, tree-ferns, bananas, casuarinas; the fauna comprises a few bats, some rodents, a few snakes, lizards, the crocodile, centipede, but bird life is more varied, and many kinds have ornate plumage. The principal islands are named in the following table, arranged in groups and showing area in square miles, population and ownership :—

ISLANDS.	SQUARE MILES.	POPULATION.	OWNERSHIP.
MICRONESIA—			
Marianne (Ladrones)	420	10,000	Germany & U.S.A.
Pelew	200	12,000	Germany
Caroline	560	39,000	Germany
Marshall	150	15,000	Germany
Gilbert	166	35,000	Great Britain
MELANESIA—			
Admiralty	770	2,000	Germany
Bismarck	20,000	188,000	Germany
D'Entrecasteaux	1,200	1,100	Great Britain
Louisade	870	2,000	Great Britain
Solomon	16,300	175,000	Great Britain and Germany
Santa Cruz	200	5,000	Great Britain
Banks	190	4,500	Great Britain
New Hebrides	5,000	70,000	Unannexed
New Caledonia	7,000	51,415	France
Loyalty	800	15,000	France
Fiji	7,450	120,000	Great Britain
POLYNESIA PROPER—			
Hawaii	6,449	154,000	United States
Phoenix	15	60	Great Britain
Ellice	14	2,400	Great Britain
Tokelau	12	520	Great Britain
Samoa	1,000	35,000	Germany
Tonga	450	30,000	Great Britain
Kermadec	40	100	Great Britain
Austral	105	1,400	France
Cook (Hervey)	140	11,500	Great Britain
Tahiti (Society)	680	18,000	France
Tuamotu (Low)	5,000	5,000	France
Marquesas	480	6,000	France
New Zealand	108,658	815,862	Great Britain.

Polynesians, collective name of all the South Sea or Pacific Islanders, practically synonymous with Kanaka. They comprise three main ethnical groups, namely, Indonesians, Micronesians and Melanesians. In a more restricted sense, the term is applied to the tall, brown natives of the eastern archipelagoes (Hawaii, Marquesas, Tahiti, Samoa, Tonga, New Zealand), who are a branch of the Indonesians, presenting great uniformity of type, speech and national traditions.

Polyp, a name formerly employed to describe such animals as the octopus and even the wood-louse, but now restricted to certain classes of the sub-kingdom Coelenterata, including medusæ, corals and sea-anemones; that is to say, animals with a tubular body whose mouth is fringed with tentacles. It may be used indifferently of an individual or of the mass or colony composed of individuals.

Polypetalous, having the petals distinct, as opposed to gamopetalous. Though among Monocotyledons this is often only a generic character—as, for instance, in distinguishing squills from hyacinths—among Dicotyledons it is of much greater

systematic importance, distinguishing a whole subclass, the Polypetaleæ.

Polyphemus, King of the Cyclops, son of Neptune. He was a monster of horrific aspect, of great height and strength, with an eye in the middle of his forehead. He herded his flocks on the coast of Sicily and delighted in human flesh. He was smitten with Galatea and killed Acis, his more fortunate rival. The *Odyssey* describes how Ulysses, who was shipwrecked on the island, dispatched the monster—who consumed two of Ulysses' band daily and now proposed to devour the hero, as a *bonne bouche*—by thrusting a burning pole into his single eye. Aroused by the pain, Polyphemus blocked the mouth of the cave, but Ulysses escaped by creeping through the legs of the rams as they were led out to pasture.

Polyplacophora, the order of the Mollusca, which includes the Chitons, in which the body is protected by a shell formed of eight overlapping plates. The group is of great geological antiquity and includes some of the most primitive of living Mollusca. The body is bilaterally symmetrical and the organs are all paired and metamerically repeated; this may be a trace of segmentation in the ancestor of the Mollusca.

Polypterus, a genus of ganoid fishes, belonging to the family Polypteridæ. It is popularly known as the Bony Pike of the Nile and is found throughout tropical Africa, particularly in the Nile, Gambia and Senegal rivers and other waters of the west coast. It is a long fish with a short snout and cylindrical body, protected with lozenge-shaped bony scales. *Polypterus bichir*, the only species, lives in the mud at the bottom of rivers, where it crawls or walks by means of its fins. It swims rapidly, after the manner of a snake. The dorsal fin is broken up into a succession of little finlets varying in number from eight to eighteen. The head is covered with enamel like that which defends the body scales. The ventral fins are well developed and the anal fin is placed close to the lower margin of the caudal fin. The central portion of the fins is fleshy and covered with scales, so that the rays appear as a fringe around it—a character met with in many of the fossil fishes of the Old Red Sandstone, which led Professor Huxley, as a matter of classification, to propose to unite them under the name of *Crossopterygidae*, or Fringe-finned fishes. *Calamioichthys calabaricus*, a remarkable form from Old Calabar, is closely allied to *Polypterus*. It is, however, much more elongated and has about a hundred vertebrae in the abdomen and ten in the tail.

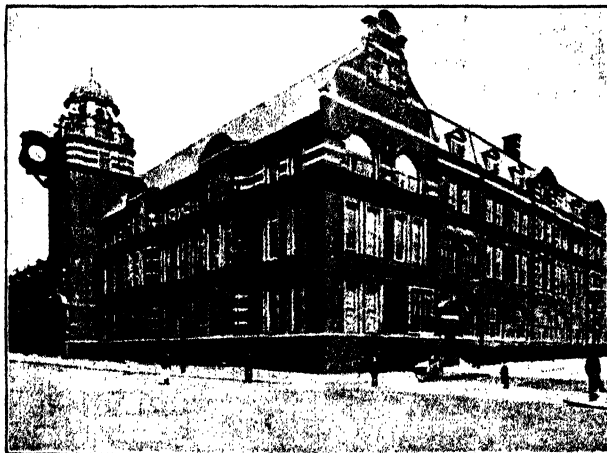
Polypus, a pedunculated or stalked tumour of somewhat rounded form, growing from a mucous surface. They are usually simple and benign, but malignant forms also occur. The varieties are *Polypi* of the nose, either mucous or fibrous (when the latter involves the back of the pharynx it is known as *naso-pharyngeal Polypus*); *Polypi* of the ear, springing either from the *membrana tympani* or from the interior of the *tympanum*;

Polypi of the intestines, most generally affecting the rectum; Polypi of the uterus (cystic, mucous or soft, and hard or fibrous); and Polypi of the bladder, larynx, gums and other less common situation. The removal of the simple kinds is a trifling operation, but the treatment of the malignant growths demands the surgeon's skill.

Polytechnic, an institution where instruction—especially practical teaching—is given in various arts and branches of technical knowledge. In 1794 the *École Polytechnique* was founded in Paris, and this has been largely imitated, especially in Germany, Switzerland and the United States. In London the Polytechnics used to be regarded as places of entertainment where popular instruction in various sciences was imparted in a more or less attractive form. As the need for more thorough teaching in technics arose, the character of the existing institutions was radically altered and many more were called into existence, provided with the latest and most scientific apparatus for instruction in all branches of technology. The better-known of such institutions are the Regent Street Polytechnic, which owed much to the foresight of Quintin Hogg, the City and Guilds of London Technical Institute, the Northampton Institute, the East London Technical Institute (People's Palace), the Borough Polytechnic, the Battersea Polytechnic

Polyzoa, a term proposed in 1830 by John Vaughan Thompson (1779-1847), the zoologist, for the individual zooids or cells which form the constituent elements in those zoophytes or plant-like animals which are now included in the class Bryozoa. The term has, therefore, been used by some English naturalists as the name of this class.

Pombal, SEBASTIANO JOSÉ DE CARVALHO, MARQUIS DE, statesman, was born at Soure, near Pombal, Portugal, on May 13th, 1699. He was educated at the University of Coimbra and, after some years spent in the law and army, went to Lisbon, where he was well received at Court. In 1739 he became ambassador to the Court of St. James's, was promoted to the embassy at Vienna in 1745, and in 1750 was made foreign secretary. The great earthquake of Lisbon in 1755 roused his energy and he did wonders for the country, making a clean sweep of many abuses. His severity was tempered by judicious concessions and he carried out a good system of national education and did much for native industries. He was the confidant of Joseph I., who created him Marquis of Pombal (1770); after the king's death Maria I., who was completely under the power of the Church, not only forbade him the Court but also tried to undo some of his beneficent work. The Marquis died in his castle at Pombal on May 8th, 1782.



NORTHAMPTON INSTITUTE.

(Photo: Pictorial Agency.)

and Goldsmiths' Institute (New Cross), in addition to the classes established by the London School Board (afterwards taken over by the London County Council). Similar institutions have been established in the leading towns of England and Scotland. In Edinburgh Heriot's Hospital, a famous foundation housed in a beautiful building, was converted into a Technical College (the Heriot-Watt) equipped with complete modern appliances.

Pome, the fruit characteristic of the sub-order Pomaceae in the order Rosaceae. It is inferior and pseudocarpic, the carpels being surrounded by a fleshy external prolongation of the floral receptacle. This may exceptionally contain one carpel only, as in one variety of the hawthorn, *Crataegus oxyacantha* (variety *monogyna*); or two, as in the variety *oxyacanthoides*; but more often five, as in the apple, pear, mountain-ash, medlar, etc. The carpels form the core and may be distinct from one another, though embedded; and may be either stony, as in the medlar or hawthorn, or parchment-like, as in the apple and the pear. The pome is surmounted by the withered calyx, which in the medlar is large and is not carried so nearly to the apex as usual. In the pear much of the peduncle is fleshy below the carpels. The fleshy part of the

pome in this species contains woody particles; that of the hawthorn is of a mealy consistence.

Pomegranate (*Punica Granatum*), the only species of an isolated genus of uncertain affinities, long valued in hot countries for the refreshing pulp of its fruit. It is a tree, 15 to 25 feet in height, native to West Asia and North Africa, but cultivated in Mexico and the southern United States.

Its opposite, simple, entire leaves have neither the glands nor the infra-marginal vein characteristic of the Myrtle order. The flower has five scarlet or white petals, an inferior ovary, and a valvate calyx. The fruit, which is about the size of an orange, is unique in having two whorls of carpels, three or four below, and from five to ten above, with a tough leathery gold-coloured, but partly reddened, exterior, and numerous seeds each surrounded by a reddish pulp. This varies in flavour in the numerous cultivated varieties. It affords a cooling drink, a wine being made from it in Persia and an ardent spirit in Mexico. The rind, bark and flowers are rich in tannin and are employed in tanning Morocco leather. The pomegranate was familiar as a fruit tree to the Romans, Assyrians, Egyptians, Hebrews, and several other Oriental peoples.



POMEGRANATE.
(*Punica Granatum*.)

Pomerania (German, *Pommern*), a province of Prussia, bounded on the N. by the Baltic, on the W. by Mecklenburg, on the S. by Brandenburg, and on the E. by West Prussia. It has an area of 11,620 square miles, and is divided into the districts of Stralsund, Stettin, and Köslin. It includes the islands of Rügen, Usedom, and Wollin. The coast lands are level, but the country grows more hilly towards the south. The principal river is the Oder, which flows through the province from south to north, dividing it into Hinterpommern or Farther Pomerania (on the east side) and Vorpommern or Hither Pomerania (on the west side) and discharging into the extensive lagoon called the Stettiner Haff, on which Stettin, the capital, is situated. Formerly an independent duchy, it was in 1648 partitioned between Sweden (which took Hither Pomerania) and Brandenburg (which took Farther Pomerania). In 1720 the Swedes ceded a great part of their domain to Prussia and in 1814 the remainder was allotted to Denmark, but Prussia acquired the whole in 1815. The soil is fairly productive, yielding potatoes, rye, oats, and in parts wheat, beetroot and tobacco. Pomeranian geese enjoy high repute throughout Germany, and the country also lends its name to a dog of medium size with long, usually white hair, straight ears and a tufted tail. Forests, abounding in game, and

great shallow lakes cover much of the area. Cattle-breeding is an important pursuit. There are immense shipbuilding yards at Stettin and the industries include the making of machinery, sugar, chemicals, paper, bricks, glass, tobacco, alcohol and beer. Pop. (1900), 1,634,832.

Pomona. [ORKNEY.]

Pompadour, JEANNE ANTOINETTE POISSON, MARQUISE DE, mistress of Louis XV., was born in Paris on December 29th, 1721. She married at the age of nineteen Le Normant d'Étiolles, the nephew of her guardian, and her beauty and charming manners attracted the attention of Louis XV., whose favourite mistress she immediately became (1745). She rapidly gained a complete ascendancy over that worthless monarch, and ruled both him and his kingdom. Her imperious and vindictive conduct and her enormous influence were visible in the wholesale manner in which she doomed hundreds of people to lifelong imprisonment for daring to object to her actions. In 1745 she was made a marchioness—Louis purchasing for her the estate of Pompadour (in the department of Corrèze) from which she took her title—and shamelessly ministered to all the king's depraved tastes, if thereby her authority might be secured. She persisted in spending her last hours at Versailles, and on her deathbed forced the king to carry out her instructions with regard to her favourites, but she kept up her *esprit* to the last moment. She died on April 15th, 1764. The French Revolution has been not unnaturally considered the result of the corruption and tyranny of Louis XV.'s reign.

Pompeii, an ancient city of Campania, Italy, on the Bay of Naples, from which it is 15 miles distant to the south-east, and at the foot of Mount Vesuvius. Founded about 600 B.C., the beauty of its site gradually made it a resort of the luxurious pleasure-seekers of Rome, and it became in course of time one of the most magnificent towns outside of the capital. In A.D. 63 it suffered severely from an earthquake and before it recovered from this calamity an eruption of Mount Vesuvius in 79 buried the whole town in volcanic ashes so effectually that the very site was forgotten. It was not until 1748 that an accident revealed its existence. The city had a circumference of about two miles, and was girt by a wall with towers at varying intervals and eight gates. In this area, besides many private villas and shops, have been discovered a forum, an amphitheatre, a theatre proper, temples of Hercules, Jupiter and Venus, etc., public baths and markets. The streets, intersecting one another at right angles, are very narrow, and the architecture, distinctly Greek, is marred by the pooriness of building materials. Most of the relics found in the city are collected at the Museo Nazionale at Naples.

Pompey the Great (CNEIUS POMPEIUS MAGNUS), the famous Roman general and statesman, was born on September 30th, 106 B.C., and was the son of Cneius Pompeius Strabo, under whom he began his military career. His father getting into

trouble, the house was attacked during the Marian tumults in Rome and Pompey did not re-enter public life till after Marius' death. He raised some legions and went to the assistance of Sulla, who was then carrying on his Mithradatic War. Sulla welcomed him warmly and gave him shortly afterwards his step-daughter in marriage, Pompey basely repudiating his lawful wife. He was sent by Sulla to Sicily, Africa and elsewhere, against the Marians, whom he defeated. Sulla made him one of his legates and surnamed him Magnus. After Sulla's death in 78 he quelled the revolt of Sertorius in Spain and put an end to the Servile

Greece, and totally defeated him at Pharsalia. Seeking refuge in Egypt, Pompey was assassinated there on September 29th, 48. Despite many excellent qualities, Pompey lacked the gifts necessary to a military genius of the first order and was not entitled to the attribute of Great.

Pompey's Pillar, a monument in Alexandria, Egypt, said to be the only important relic of antiquity left in the city. It stands on a mound at the south-western corner of the great Arab cemetery, not far from the Mahmoudiyeh Canal. The column consists of a shaft of red granite from



POMPEII IN THE PRESENT DAY (p. 101).

(Photo: Alinari, Florence.)

War, and in 70 he and Crassus were made consuls. Special powers were afterwards conferred on him for the suppression of piracy in the Mediterranean and for the conduct of the Mithradatic War. He crushed the pirates in three months, routed Mithradates' army and made Pontus (on the Black Sea) a Roman province, conquered Jerusalem and returned to Rome in 62. He might then easily have risen to the height afterwards attained by Cæsar, but he had not the political ability or readiness requisite for acting alone. Joining, therefore, with Cæsar and Crassus in a league against the senatorial rule, he became sole consul after the death of the latter. Cæsar (whose daughter Julia he had married) and he became enemies and a war ensued, in which Pompey posed as the champion of the senate and the constitution. Cæsar, who knew Pompey was unprepared, followed him to

Assonan. It is erected on a square pedestal constructed of huge blocks of stone removed from other buildings, and is surmounted with a Corinthian capital and a platform. The height of the Pillar, together with the pedestal and capital, is 89 feet, the column itself being 69 feet high, with a diameter of 9 feet at the base and about 8 feet at the top. It was set up by the Egyptian prefect Maximus as a landmark for sailors and afterwards supported a statue of the Emperor Diocletian, raised in A.D. 302 by Posidius the Roman prefect. It received its current name from the belief in the Middle Ages that it indicated the tomb of Pompey the Great.

Ponce de Leon, JUAN, a navigator and soldier, was born at San Servas, in Spain, in 1460. He was the descendant of a noble family of Aragon

and in his youth was a Court page. It is supposed that he accompanied Columbus in 1493 on his second voyage to Hispaniola, but there is some doubt about this. Obtaining permission to attempt the conquest of what is now Porto Rico, in 1508 he went there and returned with samples of its gold. In 1509 he became governor of the island and completely conquered it soon afterwards. By and by he departed, in broken health, to look for the island where, so the natives told him, was a fountain the waters of which possessed the virtue of bestowing perpetual youth upon all that should drink of it. This island eluded his vision but, in 1512, he discovered instead what is now the State of Florida. He returned to Spain with tidings of his success and Ferdinand created him governor of the new territory with full powers. Ponce afterwards went back to Porto Rico and then to Florida, where he failed to reduce the natives. In one of the fights he was mortally injured and died in Cuba in 1521.

Pondicherry, the chief French settlement in the East Indies, situated on the Coromandel coast of India, 86 miles S.S.W. of Madras. The territory, which takes its name from the town, has an area of 115 square miles and is divided into four districts. Pondicherry was first occupied by the French in 1674 and has been four times besieged by the British; captured in 1793, it was restored in 1816. The native and European inhabitants occupy separate quarters; and the place is well laid out, abundantly supplied with water, and fairly healthy. It contains a cathedral, a college, and a residence for the governor, and is defended by a citadel. The principal industries are weaving and dyeing. Pop. of territory, 190,000; of town (1901), 47,972.

Pondos (AMA-PONDO), a branch of the Zulu-Kaffirs who, in the national genealogies, claim descent from Zuide, founder of the nation, through Mpondo, brother of Xosa, who flourished in the 16th century. They occupy a territory (Pondoland), about 4,000 square miles in extent, with a population of 200,000, at the south-east extremity of Cape Colony, about midway between East London and Durban. They have maintained relations with the British since 1824, when they appealed for aid against Chaka, founder of the Zulu empire. In 1865 Taku, reputed over-lord of all the Pondos, practically accepted the British protectorate; but, despite their engagements to live in peace and discontinue sanguinary rites, there was a recrudescence of the atrocities connected with the prevalent belief in witchcraft. The country also continued to be distracted by tribal wars; and in January, 1894, the paramount chief, Selgau, descendant of Taku, was defeated with much slaughter by Partakala, the powerful chief of the Umizizi tribe. In consequence of these disorders, Pondoland was annexed to Cape Colony on September 25th, 1894.

Poniatowski, JOSEPH ANTONY, Polish prince and general, was born in Warsaw on May 7th, 1762. He was the nephew of Stanislas Augustus, last king of Poland, who died in 1798 and who was deprived of his kingdom by the Russians and

Prussians, in spite of their most emphatic promises to support him and Polish independence. Joseph Poniatowski entered the Austrian army and soon became distinguished by his prowess. He was made commander-in-chief of the Polish army (1792), and in 1794, under the dictatorship of Kosciuszko—then engaged in a heroic effort to save the liberties of his country—he defended Warsaw against the Prussians. When the third partition of Poland was completed, each of the Powers concerned in that crime offered Poniatowski military employment with high rank, but he declined to prostitute himself. The answer of the Tsar was to confiscate his property. He afterwards fought through many campaigns, assisting Napoleon against Russia. Napoleon made him a Marshal of France in 1813, but on the whole treated him shabbily. Poniatowski's valour and strategy gained many a victory in the war which closed with the subjugation of his native country. He was drowned in the Elster, on October 19th, 1813, during the flight after Leipzig, leaving a brilliant reputation as a soldier.

Pont, TIMOTHY, cartographer, elder son of Robert Pont (1524-1606), the Scottish Reformer, was born about 1560 and was educated at St. Leonard's College, St. Andrews. He was minister of Dunnet in Caithness from 1601 till about 1614. A fine mathematician, his chief claim to fame rests on his being the projector of the first Atlas of Scotland. He made a complete survey of all the counties and islands, preparing his drawings on the spot. His task was practically finished when he died (before 1625, and probably in 1614). The originals of his maps are preserved in the Advocates' Library in Edinburgh. They might have been overlooked altogether had not Sir John Scot of Scotstarvet prevailed on Robert Gordon of Straloch and his son, James Gordon, the parson of Rothiemay, to revise them for publication. They first appeared in the fifth volume of Blaeu's Atlas, published at Amsterdam in 1668.

Pontefract, or POMFRET, a town of the West Riding of Yorkshire, England, 24 miles S.W. of York. It is finely situated on a hill not far from the confluence of the Aire and Calder. The old castle, founded in the 11th century, the scene of Richard II.'s murder, was reduced to ruins by the Parliamentary army in 1649, from which cause, too, the beautiful church of All Saints was partially destroyed. The transept was restored in 1838 and further restoration was carried out thirty years later. Archbishop Lee was dragged from his throne in this church during the Pilgrimage of Grace in 1536. The castle ruins and grounds have been secured by the municipality and converted into a museum and open space. The Town Hall is a good structure and the King's School, founded by Edward VI., was equipped with new buildings and provided with a fresh scheme of control and education in 1890. Liquorice is grown in the neighbourhood for the manufacture of Pomfret cakes, and there are iron-foundries, brick and terracotta works, tanneries and breweries, while vegetables are largely grown for the markets of Wakefield and Leeds. Pop. (1901), 13,427.

Pontevedra, a maritime province of Spain, bounded on the N. by Corunna, on the E. by Lugo and Orense, on the S. by Portugal, and on the W. by the Atlantic, with an area of 1,739 square miles. The surface is hilly and the coast much indented. The people are mostly engaged in agriculture, the chief crops being rye, oats, barley, wheat and maize, while the vine is cultivated widely and livestock are raised. Pop., 447,612. PONTEVEDRA, the capital, a picturesque granite-built town, dates back to the Roman period, the Lerez being spanned by the old Roman bridge from which the town derived its name (*pons vetus*). The principal industries are the sardine fishery and the manufacture of cloths and hats. Pop., 20,000.

Pontifex, in ancient Rome, was the name given to priests of the nation attached to no particular cult, but exercising a general supervision over them all. The office is said to have been instituted by Numa, and the college consisted of five, presided over by the High Priest or Pontifex Maximus. In 300 B.C. the number was increased to nine, including the Pontifex Maximus, and four of them had to be elected from the plebs; under Sulla (138-78) they numbered fifteen, and in the time of Julius Cæsar (100-44) sixteen. They formed a kind of State episcopate; and among their chief functions were the inauguration of priests, the securing of the due observation of Vesta's rites, the taking care of the public annals, the administering of the ecclesiastical law, and the regulating of the calendar and public worship. Their distinctive dress was the toga prætexta as well as a conical hat made of the skins of sacrificial animals. During the empire the post of Pontifex Maximus was occupied by the Emperor, till the time of Theodosius (A.D. 346-395), and after that period by the Pope.

Pontifical, a book of the Roman Catholic Church, containing the prayers and rites used upon various occasions by Popes and bishops. It is said to have been first compiled by Pope Gelasius (492), and to have been re-edited by Gregory the Great (590). The present pontifical was revised by Clement VIII. in 1596 and has frequently been republished.

Pontigny, a village of the department of Yonne, France, on the left bank of the Serain, 11 miles N.E. of Auxerre. It is the seat of a famous Cistercian abbey founded in 1124. Three archbishops of Canterbury sought its friendly shelter from the tyranny of kings, namely Thomas Becket in 1164, Stephen Langton 1208 and Edmund in 1240, the last-named being buried there in that year. The abbey church, completed about 1165, is one of the most beautiful examples of the architecture affected by Cistercians.

Pontoon, a flat-bottomed boat, or other equivalent contrivance, used in military engineering for supporting a floating bridge to afford passage to troops. The most usual forms are a decked cylinder or an undecked boat. The pontoon, as last modified for the British army, consists of a light, half-decked boat of thin wood, covered with

canvas. The modern pontoon is the production of the 18th century, but floating bridges were used by Darius, Xerxes, and other ancient campaigners. The bridge of boats at Coblenz on the Rhine virtually consisted of a roadway or a platform supported on a number of pontoons moored across the river.

Pontoppidan, ERIK, geographer, naturalist and author, was born at Aarhus, Jutland, Denmark, on August 24th, 1698, and was educated at Copenhagen University. After acting as tutor or bear-leader to several noblemen's sons during several years he became one of the king's chaplains in 1735, professor extraordinary of Theology at Copenhagen in 1738, and in 1747 Bishop of Bergen in Norway, where he died on December 20th, 1764. His chief works are *Theatrum Daniæ veteris et modernæ* (1730), giving an account of the geography and natural history of Denmark; *Gesta et Vestigia Danorum extra Daniam* (1740), a narrative of the exploits of Danes outside of their native land, and *Det første Forsøg paa Norges naturlige Historie* (1752-4), a description of the natural history of Norway, containing much naïve information about the kraken, sea-serpent and other animals likely to interest a credulous observer.

Pontus, a name given to a district in the north-east of Asia Minor on account of its proximity to the Euxine, which the Greeks frequently called simply Pontus (suppressing Euxinus). It was bounded on the W. by Paphlagonia and Galatia, on the S. by Cappadocia, on the E. by Armenia Minor and the N. by the Black Sea. Originally part of Cappadocia, it became a separate satrapy, and was finally erected into a kingdom by Ariobarzanes early in the 4th century B.C. Pontus next became a Roman province in 60 B.C., on the defeat of Mithradates. The western half and the coast from Trebizond (ancient, Trapezus) to the mouth of the Halys were fertile and civilised. Amasia, on the Iris (modern, Yeshil-Irmak) was made his capital by Mithradates and was the birthplace of Strabo.

Pontypridd (Welsh, "bridge by the earthen house"), formerly called NEWBRIDGE, a town of Glamorganshire, Wales, at the confluence of the Taff and Rhondda, 11 miles N.W. of Cardiff. The chief buildings are the Town Hall, court house and free library. Proximity to abundant supplies of coal and iron has developed the place from a mere village (which was its condition when George III. died) to a flourishing town. The industries, in addition to iron- and coal-mining, include iron- and brass-founding and the making of anchors, chains, cables, tinplates and chemicals. It was here that the chain work of the old Hammersmith suspension-bridge and the chain pier at Brighton (which was finally demolished by a storm) was fabricated. Both the former and the present names of the town recall the remarkable story of perseverance and skill displayed by William Edwards, a local mason and self-taught engineer and architect, in the construction of the bridge over the Taff. The first bridge he built, consisting of three arches, was swept away within three years of its completion when the river was in spate. To give the stream in flood as

little purchase as possible, Edwards next threw across the Taff a bridge of a single span (140 feet), but this erection also collapsed, the deadweight on the haunches rending asunder the crown of the arch. Still Edwards was not down-hearted, but at once set about building a third bridge. He reduced the deadweight on the haunches by carrying through each spandril three cylindrical tunnels, or openings, running from face to face and also by filling the spaces between the faces with charcoal instead of rubble, thereby enormously reducing the weight, bulk for bulk. This structure—comprising a single arch, forming a segment of a circle 170 feet in diameter, the length of the chord being 140 feet, the height above the water about 35 feet and the width 15 feet—was completed in 1750, but being too steep and narrow for modern vehicular traffic, a three-arched bridge was built in 1857. Edwards's picturesque structure still stands, however, a monument to his patience and ingenuity. On a height above the Taff stands a logan stone where, in other days, the bards were wont to meet as in a miniature Eisteddfod, for the purpose of hearing poetical compositions and awarding degrees. Pop. (1901), 32,316.

Poodle, a breed of dogs, introduced into Great Britain from the Continent early in the 19th century. They are affectionate and intelligent and, from the readiness with which they learn tricks, are often trained by showmen as performing dogs. There are two principal varieties: the white and the black (the larger of the two). The coat is thick and mat-like and is generally shaved or clipped so as to give the dogs a grotesque appearance. Not satisfied with this, some owners even dye their pets of various colours, generally the more *outré*—as a yellow tail to a magenta body—the better (in their estimation). The White Poodle makes a good house-dog and the Black Poodle is not only a faithful companion, but a good water-dog and retriever. The small variety of Poodle known as the Barbet, though equally sagacious, is ill-tempered and only amenable to its master and not always to him.

Pool, a game played by an indefinite number of players upon a billiard-table. It is played with a white and several coloured balls, which are drawn at hazard by the different players. The white ball having been placed on the spot, the holder of red plays upon white (being described as "white's player"), and the remaining colours in order upon each other, according to their succession as indicated on the scoring-board. Each player starts with three lives. If the player hits the ball he plays upon and holes it, the owner of that ball loses a life, and pays a fine to the player; if the player gives a miss, or holes his own ball, he loses a life, and pays a fine to the holder of the ball he played upon. The first to lose three lives has the opportunity of stalling, *i.e.*, he may buy a fresh supply of lives, not exceeding the smallest number of lives remaining in the pool. When two players only remain, it is usual for them (unless there is marked difference in their scores) to divide the pool, which consists of stakes of an agreed-on amount contributed by every player. Before a

game begins, the fine for every life must be fixed—generally a very modest sum. This, the usual variety of the game, is sometimes called *Following Pool* to distinguish it from *Selling Pool*, in which the player may play on any ball he pleases, and from *Snooker Pool*, which is, however, preferably regarded as a variety of *Pyramids*.

Poole, a seaport of Dorsetshire, England, 6 miles S. of Wimborne. The town stands at the head of a capacious harbour which, at high water, presents a picturesque appearance, though the greater part of it is somewhat shallow. It is remarkable for its two tides. After flowing for six hours, the water ebbs for an hour and a half and flows again for a similar period, making high water a second time and ebbing again for the other three hours. The oyster beds in the harbour enjoy a good reputation. The industries include shipbuilding (yachts especially) and the making of sailcloth, nets and cordage. Great quantities of clay are shipped for the Staffordshire potteries, and there are also local potteries, besides considerable traffic in corn, flour and timber. The buildings comprise the Guildhall, free library, cottage hospital and school of art, in addition to St. Paul's Church in the Grecian style and the church of St. James, on the site of an earlier edifice, in the Late Perpendicular. On Brankssea, Brownsea, or Branksome Island, at the entrance to the harbour, stands a castle built in the reign of Henry VIII. and repaired by Elizabeth, who appointed Sir Christopher Hatton keeper in 1576. It was fortified by the Parliamentarians during the Civil War, and ceased to be a fortress in 1722. Pop. of Poole (1901), 19,461.

Poole, JOHN, dramatist, was born in 1786 (though possibly a year or two later), and began to write for the stage at a comparatively early age. He was lucky to secure from the start the patronage of the best managers. In 1813 he produced *Hamlet Travestie* at Drury Lane, for the benefit of Mr. and Mrs. Liston. For Drury Lane he also wrote, among other plays, *Deaf as a Post* (1823) and a farce called *Turning the Tables*. At Covent Garden he was represented by several adaptations, amongst them *The Scapegoat* (1825) and *The Wife's Stratagem* (1827). The Haymarket secured his masterpieces *Paul Pry* (1825) and *Twist the Cup and the Lip* (1826). "Paul Pry" became a favourite with all the leading comedians, especially with John Sleeper Clarke (1835-79), Lionel Brough (1836) and John Lawrence Toole (1832-1906). For several years Poole lived in Paris, where he was a *habitué* of the *Comédie Française*, and later he became a brother of the Charterhouse, which he ultimately left, finding the confinement irksome. For the last years of his life he enjoyed a pension, procured through the instrumentality of Charles Dickens. He died in London in February, 1872.

Poona, a district and its capital in the Bombay Presidency, India. The former has an area of 5,348 miles and, being situated on the plateau of the Deccan, enjoys a dry and healthy climate. It is broken by spurs from the Ghats to the west, but the eastern part is level and fertile. The chief

river is the Bhima, flowing north to south. The district was the home of the Mahratas. The principal crops are wheat, barley, rice, millet, pulse and oil-seeds, but the grape-vine, sugar-cane and tobacco are also cultivated. The leading manufactures are silks, cottons, blankets; brass and silver work; toys; ornaments; baskets, fans of Khas-Khas grass adorned with peacocks' feathers and beetles' wings; and well-dressed clay figures. Paper-making, once important, has greatly declined. The district suffered severely in the famine of 1876-7. Pop. (1901), 995,074. The town of POONA, on the right bank of the Muta, 75 miles S.E. of Bombay, is the military capital of the Deccan and from July to November the seat of the government of Bombay Presidency. It owes its repute as a health-resort to its altitude of nearly 2,900 feet above sea-level. The manufactures include cotton, silk, paper, jewellery, art-metal ware, flour, ice and mineral waters, besides brewing. It is a famous educational centre, containing the Deccan College, Fergusson College, colleges of science, technics, agriculture, forestry, and medicine, besides numerous high-class schools. Pop. (1901), 111,386.

Poor Laws are those provisions which are made in Great Britain for regulating the support of the indigent poor. The need of them was hardly felt before the Reformation, since the monasteries and religious houses maintained large numbers, while the Church encouraged alms-giving as a pious practice. Hence, each neighbourhood easily supported its own poor. Under Henry VIII. the question began to be pressing and was met by parochial collections subject to legally authorised clerical pressure. In 1601 the Act 43 Elizabeth began the foundation of the existing poor law system by creating overseers who had power to raise money to grant in sums for relief, or to provide work for the poor. Workhouses became general under an Act in 1723; unions of parishes were authorised in 1782. Later, especially during the French wars, out-door relief became prevalent, and justices were made the relieving authority (1815), and (in the country) paupers were commonly assigned as labourers to the various farmers in a parish. The relief thus kept wages down and was given so recklessly that rates in some parishes reached 20s. in the £. The system "discouraged thrift and acted as a premium on vice." The Act of 1834, passed as the result of a Parliamentary Commission, established the present system in outline and instituted a central control, vested since 1871 in the Local Government Board. The discretion of giving either out-door or in-door relief has existed since 1834. The Scottish and Irish systems closely approximate to that of England, but in Scotland there are no union workhouses (though county authorities may combine to erect poorhouses) and relief is not given to able-bodied adults. The treatment of poor-law children has formed the subject of serious consideration on the part of social reformers, anxious to spare the young as much as possible of the pauper taint. The boarding-out system has been extensively adopted, while cottage

homes, district schools and scattered homes have also been established in many parts of England. The whole Poor Law system is at present under consideration. The lengthy report issued in Feb., 1909, by the Poor Law Commission recommended the abolition of Poor Law Guardians, of workhouses as at present constituted, and other drastic reforms.

Pope (Latin, *papa*; Greek, *pappas*, "father"), a title applied in the Eastern Church to all priests, and in the Ancient Western Church to bishops, being, however, gradually restricted (in the 6th century) in the Western Church to the Bishop of Rome, and reserved to him since 1073, though it has also been an especial title of the Patriarch of Alexandria since the middle of the 3rd century. The position of the Pope *par excellence*, i.e., the Bishop of Rome, is usually regarded as implying the headship of the (Roman) Catholic Church. According to (Roman) Catholic teaching, however, a more extensive claim was made, for the Pope was considered as the successor of Peter and, as such, vicar of Christ and visible head, pastor and teacher of all Christians. This claim began to be asserted early in the history of the Papacy. In the 5th century the Pope was generally recognised as *primus inter pares*, and in 449 Leo the Great claimed supremacy upon Scriptural grounds. The question of supremacy caused the Great Schism in 1054. Gregory I. and Leo III. were largely instrumental in building up the Papal power, while Innocent III. (1198-1216) put the final touches to the edifice. He it was who laid the foundations of the temporal power by claiming as lord paramount the title to lands the possession of which had its origin in a grant made by Pepin. The full claims of the Papacy are to a universal spiritual supremacy and to a large territorial sovereignty. Since the loss of the temporal power the Pope has confined himself to the Vatican. The doctrine of Infallibility dates from 1870 and decrees that when the Pope speaks *ex cathedra*—in virtue of his office and his supreme apostolic authority—his teaching in matters of faith and morals is final and infallible.

The following is a list of the Popes and the dates of their consecration:—

LIST OF POPES AND DATES OF ELECTION.

Peter	41	Novatianus (anti-pope)	
Linus	67	Lucius I.	253
Cletus or Anacletus	79	Stephen I.	254
Clement I.	91	Sixtus II.	257
Evaristus	100	Dionysius	258
Alexander I.	109	Felix I.	260
Sixtus I.	119	Eutychianus	275
Telesphorus	128	Caius	283
Hyginus	138	Marcellinus	296
Pius I.	142	Marcellus I.	307
Anicetus	157	Eusebius	309
Soter	168	Melchior	310
Eleutherus	177	Sylvester I.	314
Victor I.	190	Marcus	336
Zephyrinus	202	Julius I.	337
Calixtus I.	218	Liberius	352
Urban I.	223	Felix II. (anti-pope)	
Pontianus	230	Damasus I.	366
Antherus	235	Ursicinus (anti-pope)	
Pabianus	236	Siricius	384
Cornelius	251	Anastasius I.	396

Innocent I.	402	Anastasius III.	911
Zosimus	417	Lando	913
Boniface I.	418	John X.	914
Celestinus I.	422	Leo VI.	928
Sixtus III.	432	Stephen VIII.	929
Leo I.	440	John XI.	931
Hilarius	461	Leo VII.	936
Simplicius	468	Stephen IX.	939
Felix III.	483	Marinus II.	942
Gelasius I.	492	Agapetus II.	946
Anastasius II.	496	John XII.	955
Symmachus	498	Leo VIII.	963
Hormisdas	514	Benedict V.	964
John I.	523	John XIII.	965
Felix IV.	526	Benedict VI.	973
Boniface II.	530	Benedict VII.	974
John II.	532	John XIV.	983
Agapetus I.	535	Boniface VII.	984
Silverius	536	John XV.	985
Vigilius	537	Gregory V.	990
Pelagius I.	555	Sylvester II.	999
John III.	560	John XVII.	1003
Benedict I.	574	John XVIII.	1003
Pelagius II.	578	Sergius IV.	1000
Gregory I.	590	Benedict VIII.	1012
Sabinianus	604	John XIX.	1024
Boniface III.	607	Benedict IX.	1033
Boniface IV.	608	Sylvester (anti-pope) ..	
Deusdedit I.	615	Gregory VI.	1045
Boniface V.	619	Clement II.	1046
Honorius I.	625	Damasus II.	1048
Severinus	640	Leo IX.	1049
John IV.	640	Victor II.	1055
Theodorus I.	642	Stephen X.	1057
Martin I.	649	Benedict X.	1058
Eugenius I.	654	Nicolas II.	1059
Vitalianus	657	Alexander II.	1061
Deusdedit II.	672	Gregory VII.	1073
Donnus I.	676	Clement III. (anti-pope) ..	
Agathon	678	Victor III.	1086
Leo II.	682	Urban II.	1088
Benedict II.	684	Paschal II.	1099
John V.	685	Albert (anti-pope) ..	
Conon	686	Theodoric (anti-pope) ..	
Sergius I.	687	Gelasius II.	1118
John VI.	701	Calixtus II.	1119
John VII.	705	Honorius II.	1124
Sisinius	708	Innocent II.	1130
Constantine	708	Anacletus (anti-pope) ..	
Gregory II.	715	Celestinus II.	1148
Gregory III.	731	Lucius II.	1144
Zacharias	741	Eugenius III.	1145
Stephen II.	752	Anastasius IV.	1153
Stephen III.	758	Hadrian IV.	1154
Paul I.	767	Alexander III.	1159
Constantinus II.	767	Victor (anti-pope) ..	
Stephen IV.	768	Paschal (anti-pope) ..	
Hadrian I.	772	Calixtus (anti-pope) ..	
Leo III.	795	Lucius III.	1181
Stephen V.	816	Urban III.	1135
Paschal I.	817	Gregory VIII.	1187
Eugenius II.	824	Clement III.	1187
Valentinus	827	Celestinus III.	1193
Gregory IV.	827	Innocent III.	1198
Sergius II.	844	Honorius III.	1216
Leo IV.	847	Gregory IX.	1227
Benedict III.	855	Celestinus IV.	1241
Nicolas I.	858	Innocent IV.	1243
Hadrian II.	867	Alexander IV.	1254
John VIII.	872	Urban IV.	1261
Marinus I.	882	Clement IV.	1265
Hadrian III.	884	Gregory X.	1271
Stephen VI.	885	Innocent V.	1276
Formosus	891	Hadrian V.	1276
Sergius (anti-pope) ..		John XXI.	1276
Boniface VI.	896	Nicolas III.	1277
Stephen VII.	896	Martin IV.	1281
Romanus	897	Honorius IV.	1285
Theodorus II.	897	Nicolas IV.	1288
John IX.	898	Celestinus V.	1294
Benedict IV.	900	Boniface VIII.	1294
Leo V.	903	Benedict XI.	1303
Christopher	903	Clement V.	1306
Sergius III.	904	John XXII.	1316

Nicholas (anti-pope) ..		Pius V.	1566
Benedict XII.	1334	Gregory XIII.	1572
Clement VI.	1342	Sixtus V.	1585
Innocent VI.	1352	Urban VII.	1590
Urban V.	1362	Gregory XIV.	1590
Gregory XI.	1370	Innocent IX.	1591
Urban VI.	1378	Clement VIII.	1592
Clement VII. (anti-pope) ..		Leo XI.	1605
Boniface IX.	1389	Paul V.	1605
Benedict XIII. (anti-pope) ..		Gregory XV.	1621
Innocent VII.	1404	Urban VIII.	1623
Gregory XII.	1406	Innocent X.	1644
Alexander V.	1409	Alexander VII.	1655
John XXIII.	1410	Clement IX.	1667
Martin V.	1417	Clement X.	1670
Eugenius IV.	1431	Innocent XI.	1676
Felix (anti-pope) ..		Alexander VIII.	1689
Nicolas V.	1447	Innocent XII.	1691
Calixtus III.	1455	Clement XI.	1700
Pius II.	1458	Innocent XIII.	1721
Paul II.	1464	Benedict XIII.	1724
Sixtus IV.	1471	Clement XII.	1730
Innocent VIII.	1484	Benedict XIV.	1740
Alexander VI.	1492	Clement XIII.	1758
Pius III.	1503	Clement XIV.	1769
Julius II.	1503	Pius VI.	1775
Leo X.	1513	Pius VII.	1800
Hadrian VI.	1522	Leo XII.	1823
Clement VII.	1523	Pius VIII.	1829
Paul III.	1534	Gregory XVI.	1831
Julius III.	1550	Pius IX.	1846
Marcellus II.	1555	Leo XIII.	1878
Paul IV.	1555	Pius X.	1908
Pius IV.	1559		

Pope, ALEXANDER, poet, was born in Lombard Street, London, of Roman Catholic parents, on May 21st, 1688. His father was a linen merchant and his mother belonged to an old family. After the Revolution of 1688 they retired from business and went to live on a small property in Windsor Forest. A priest attached to the family taught the boy Latin and Greek; and, being of a sickly and delicate nature, Alexander gave up most of his time to reading and writing and was able to write verse at a very tender age. His first school was at Twyford, but he was afterwards sent to an establishment at Hyde Park Corner. His father gave him every encouragement to continue to write and seemed to take pride in his son's proficiency in rhyme. For Dryden the boy had a great admiration and counted it one of his happiest moments when he managed to see "glorious John." He began to study French and Italian literature and continued to produce much poetry. His pastorals, which appeared in 1709, had been written much earlier. Through Sir William Trumbull he made the acquaintance of several of the leading writers of the day, notably Congreve, Gay and Wycherley. His *Essay on Criticism* (1711) led to a slight friendship with Addison, which was not long in duration. The intimacy contracted with Swift remained unbroken till death. Though only twenty-five, he had already become well known, and his *Rape of the Lock* (1712-14), *Windsor Forest* (1713), and other works made him one of the most celebrated men of his time. He wrote the prologue (1713) to Addison's *Cato* and began to work on a translation of Homer which he had long meditated. Swift assisted him greatly with his influence and the first volume of the *Iliad* was published in 1715, the other volumes appearing between that date and 1720. By this work, which is still read with pleasure and is indeed an English

classic, Pope is believed to have made at least £5,000. His father died in 1717, leaving little money to his son, and in the same year appeared a collection of the latter's miscellaneous pieces which were much admired. He was now generally recognised as one of the great poets, but was always subject to attacks from the smaller fry of literature, who knew his sensitiveness to criticism and satire. In 1725-6 his version of the *Odyssey* came out and from this work, in which he had been assisted by one or two other writers, he is supposed to have obtained several thousand pounds also. But he had not forgotten the abuse of the Grub Street writers and in 1728 appeared his scathing satire of the *Dunciad*, into which are introduced all his enemies and some writers who hardly deserved such treatment. In later editions he included others whose envy he had aroused or whom he disliked. His brilliant *Epistles* (1731-2) came out soon after the *Dunciad*, and in 1733 he published the first part of his famous *Essay on Man*, the rest following in 1733 and 1734. His health, which had always been bad, grew worse before 1740 and on May 30th, 1744, he died in the beautiful villa he had purchased at Twickenham. He was buried in the parish church of that place. Pope will always remain one of the most popular of English poets. Few writers have had his gift of clear expression and his epigrammatic brevity to such a degree and his lines are usually so pointed and smart that they remain in the memory and have in many cases become proverbs. In satirical power he has had few equals and there are great verve and brightness in his descriptions. He holds a high rank, too, as a prose-writer, his *Letters* being among the best in the language.

Popinjay, an ancient pastime formerly in great favour with archers, and eagerly pursued even after the invention of firearms. By bowmen and fusiliers it was known as shooting at the popinjay, an old name for a parrot. A parrot or other bird, suspended from the top of a pole, so that it might swing freely in the breeze, was used as a mark. When a parrot was not available another bird tricked out to resemble it was fired at. The competitors fired in rotation from a distance of sixty or seventy yards. The marksmen who brought the object down was styled for the day Captain of the Popinjay. Sir Walter Scott introduces the sport in *Old Mortality*. The green woodpecker and the jay, as well as the parrot, were both called popinjays.

Poplar, the English name for the trees of the genus *Populus*, which belongs to the Willow tribe, and is distinguished by its broad leaves on long, vertically-compressed leaf-stalks, jagged catkin-scales to both male and female catkins, rudimentary perianth tube, numerous stamens, and cottony seeds. Poplars are quick-growing trees, forming soft wood, of little use except for paper-pulp; but several species are ornamental trees. *P. alba* (the White Poplar or Abele), *P. canescens* (the Grey Poplar), *P. nigra* (the Black Poplar), and *P. tremula* (the Aspen) are natives of Great Britain. *P. fastigiata*, the Lombardy Poplar, a variety of the

Black Poplar, with fastigate or vertical branches, reaching a height of 100 to 150 feet and now forming a familiar change in what might be monotonous in English landscape, is of comparatively recent introduction into the United Kingdom. They are a characteristic and pleasing feature in French pastoral scenery. In the United States poplars are known as "Cottonwoods," from the light cottony tuft at the base of the numerous small seeds. The so-called Black Italian Poplar (*P. monilifera*) and the Tacamahac (*P. balsamifera*) are natives of the New World commonly planted in England.

Poplin, a woven material, consisting of a silk warp and a woollen weft; sometimes, however, cotton and flax are substituted for silk. The wool or worsted being thicker than the silk produced the corded surface. The yarn gave substance and the silk glossiness to the material. The manufacture, which is one of the staple industries of Ireland and is especially associated with Dublin, was introduced into that country by French refugees in 1775.

Popocatepetl (Mexican, "smoking mountain"), a volcano in Mexico, about 45 miles S.E. of Mexico City. It reaches an altitude of 17,540 feet above the sea and has the shape of a symmetrical snow-covered cone. The summit crater is about 2,600 feet in diameter and nearly 700 feet deep. Forests clothe its sides to a height of nearly 3,000 feet. Indians (whose huts are at the foot of the cone) work the crater for sulphur, which is shot down slides to a lower level for removal. The volcano was active at the time of the Spanish conquest and in 1664. Popocatepetl, which is easy of ascent, has been often climbed since 1519 and 1522 when some of the followers of Hernan Cortes essayed the feat.

Poppy, the genus *Papaver*, the type of the order *Papaveraceæ*, a small group of herbs with a milky juice; fibrous roots; generally lobed leaves; ebracteate axillary flowers, with two or three caducous, half-equitant sepals; four or six crumpled petals; numerous stamens, often black; and a syncarpous ovary, with radiating stigma, forming a many-seeded pore-capsule with partial septa. Four species with scarlet flowers are common



OPIMUM POPPY.
(*Papaver somniferum*.)

weeds in cultivated ground in England, but are susceptible to frost, which suggests an exotic origin. The most important species is *P. somniferum*, the opium poppy, supposed to be a native of the Levant, but now widely grown, in part as a garden flower. It is an erect annual, two to five feet high, entirely glaucous, with sinuous sessile leaves and petals of various colours, but most com-

Indian Council, would lend that of China effective support in its effort to put down practices that were sapping the manhood of the Chinese people. At the same time, on the principle *Timeo Danaos et dona ferentes*, there were many who saw in the edict only a subtle move on the part of the Chinese to suppress the foreign-grown while encouraging the home-reared article.



PORCELAIN.

1. Bow : Fifer. 2. Royal Worcester. 3. Sèvres Jardiniere. 4. Typical Derby.

monly white or violet, and often double. The flower bud is pendulous. From the capsules syrup of poppies, a powerful sedative, the anodyne fomentation, the decoction of poppy-heads, and an extract are prepared in Great Britain; but in India, Persia, Egypt and other countries the plant is grown mainly for the manufacture of opium, which is obtained by incisions in the unripe capsules whence the latex exudes and coagulates. The seeds yield nearly 50 per cent. of a valuable, pale golden, scentless oil of agreeable taste, not narcotic, used by painters, in India in cookery, and as an adulterant of olive oil. The seeds themselves are eaten in India, Greece and elsewhere. There are two varieties, the white and the greyish-black, the latter being used under the name of maw-seed for cage-birds. In 1906 the Chinese Government issued an edict condemning the vice of opium-smoking and opium-eating and ordering the total prohibition of its use, whether of home or foreign origin, within ten years of that date. Though this decision had far-reaching effects as far as the Indian revenue was concerned, the edict was received with satisfaction by public opinion and it was understood that the British Government, acting through the Secretary of State and the

Porbeagle, a shark belonging to the genus *Lamna*, with three species, from temperate seas. One, called also the Beaumaris Shark, from the Atlantic, sometimes occurs off the British coasts and in the Mediterranean and the Sea of Japan. It attains a maximum length of ten feet, though the usual length is four feet, the body in front of the pectoral fins measuring two feet in circumference. In British waters it is sometimes taken in mackerel and salmon nets and on lines set for haddock. It feeds voraciously on cuttlefish, pilchards, herrings and hake. It grows rapidly, reaching almost its full size before the second row of teeth is cut. It is occasionally eaten in Mediterranean lands but is used as a manure in England.

Porcelain. This substance, the name of which is derived from the Italian *porcellana* = "a shell," appears to have been completely unknown to the older European nations. It was, however, known to, and manufactured by, the Chinese at a very early period, and about the 16th century large quantities were introduced from China into Europe. It was not, however, until 1709 that its manufacture was attempted in Europe, in which year Johann

Friedrich Böttger or Böttcher (1682-1719), a German chemist, having discovered the method of its preparation, started works at Meissen, near Dresden. For many years the process remained secret, but in 1754 the celebrated potteries at Sèvres were founded and at intervals other centres of the industry sprang up. The first places in England to carry out the porcelain manufacture were Chelsea and Bow, shortly followed by Derby and Worcester. In composition, porcelain consists chiefly of a very pure clay known as kaolin, which is almost pure hydrated silicate of alumina. This substance seems to be derived chiefly from the natural disintegration of the felspar of rocks. It is found largely in China, at Limoges in the French department of Haute Vienne, in Cornwall, and various American localities. It is very infusible, and for the manufacture of porcelain is mixed with a fusible silicate, usually felspar, the proportions of the two substances varying with the different varieties of the product. They are well mixed and water is added until of a sufficient plasticity; the mass is moulded to the required shape, dried at ordinary temperatures and baked in a low-temperature kiln. They are then glazed by dipping into water containing felspar in suspension, dried and exposed to a very extreme heat in crucibles in a furnace; after heating, the furnace is very slowly cooled, as otherwise the porcelain would be very unstable and brittle. Statuary porcelain is an unglazed porcelain used chiefly for the production of statuettes, etc., and was introduced in the year 1842, being also frequently known by the name of Parian porcelain or Parian marble. Porcelain takes paint in very much the same way as glass, the pigments being applied and "burnt in" by heating the substance. The Sèvres porcelain is generally considered to be the finest example of this branch of art, owing chiefly to the beauty, richness, and depths of the colours.

Porcupine (literally, "the spiny pig"), an animal belonging to the Rodent family Hystricidae, in which the skin is set with long, strong spines—the quills of the "fretful porpentine,"—which it was once supposed to shoot at its enemies with



PORCUPINE

unerring aim and which are a not inconsiderable weapon of defence. They fall into two groups: (1) New World Porcupines, for the most part

arboreal, in which the tail of the South and Central American species is prehensile, though it is non-prehensile in the variety found in Canada and the Eastern and Western United States; (2) Old World Porcupines, in which the spines are much more fully developed and the tail is not prehensile.

Hystrix cristata, the Common Porcupine, occurs in Southern Europe and North Africa, is about thirty-two inches long including the shortish tail and feeds—as, indeed, do the Porcupines of both hemispheres—on herbage, roots, fruits, leaves and bark of trees and flowers. Like that of most of the purely vegetarian rodents, its flesh is very good and the animal is an article of diet in the countries where it is found. There are some other species. The Brushtailed Porcupines, with flattened spines at the end of the tail, constitute the genus *Atherura*.

Porifera. [SPONGE.]

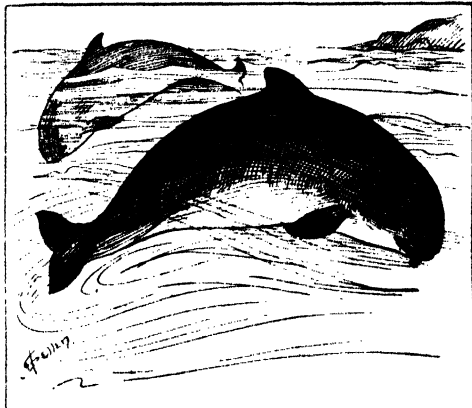
Pork, the flesh of swine, is a food in very general use in most parts of the world, except among Jewish and Mohammedan communities. Its great advantages are cheapness of production, since the pig is a prolific animal and a general feeder, and the ease with which it can be preserved without losing its good qualities. The chief prejudices against its use seem to have their ground in the fact that the flesh is rather difficult of digestion when it is fresh and that the flesh is greatly affected by insanitary feeding and is in any case to be avoided in hot weather, though a hot climate seems to have little deleterious effect on pork-eaters, since it is a favourite food in the South Sea Islands. Properly to appreciate pork, one has only to eat the flesh of pigs fed on acorns, beech-mast, or dairy-produce, and allowed free grazing and exercise, or to taste a well-smoked wild boar's ham. Ireland, Canada and the United States do an immense trade in pork, but Westphalian and Spanish hams are also in high esteem.

Porphyry, a term signifying literally "purple," the precise limitations of which, as applied to certain ornamental stones in ancient times, are uncertain. The Romans employed the word *porphyrites* to designate a rock having a dark crimson ground through which were distributed small crystals of felspar. In Pliny's time this rock, quarried in Egypt, was utilised for the purposes of architecture and ornament, especially for the lower part of busts the upper part of which consisted of bronze or marble, though sometimes the whole bust was carved from porphyry. The quarries in the island of Sardinia also supplied a variety of the rock that was in great request. Modern petrographers prefer to use it rather in an adjectival form as applying to any igneous rock in which one or two minerals occur in large distinct crystals, as, for instance, does the orthoclase felspar in the porphyritic granite of Shap Fell.

Porphyry, Greek philosopher, whose real name was MALCHUS, was born at Tyre in Syria in 233. He was the pupil of Origen and Longinus, and at Rome was a follower of Plotinus. He combated

the Christianity of his time in a book which has practically perished, but which caused much discussion and provoked many replies and was condemned in 448 by an edict of the emperors Theodosius II. and Valentinian. He also wrote a work against the eating of flesh, a life of Plotinus and a life of Pythagoras, and advocated the strictest asceticism as well as the knowledge of God. He was not an original thinker, but an echo of Plotinus chiefly. His best-known work is a treatise on *The Five Predicables*, one sentence in which stated the chief problem which the Schoolmen endeavoured to solve. He died about 303.

Porpoise (literally, "the pig-fish"), a mammal belonging to the Cetacean genus *Phocaena* of the Dolphin family, with two or three species from the Atlantic and Pacific Oceans, though it has a wide distribution, occurring also in the Mediterranean and the Arctic seas. They are migratory. There are



PORPOISE.

twenty-six teeth on each side in each jaw; the pectoral limbs are of moderate size and oval in shape; and there is a triangular dorsal fin about the middle of the back. The Common Porpoise (*Phocaena communis*), abundant round the British coasts and frequently entering large rivers, is gregarious in habit and the gambols of a shoal of Porpoises may have suggested some of the stories of the "sea-serpent." The average length is about five feet; and the coloration is dark-grey or black above and white below, but there is no distinct line between. They have a somewhat rounded head and diminutive eye and the ear is not visible. They feed on fish, and, as they follow the schools of mackerel, herrings and pilchards, are often taken by the fishermen in their nets. The commercial value of the Porpoise depends on the oil obtained from its blubber and the leather into which the hide is made. Much of what is sold as Porpoise leather, however, is in reality the skin of the White Whale. The natives of Moreton Bay tame Porpoises to fish for them. When fishes enter the bay the people rouse the Porpoises which dash among the fishes,

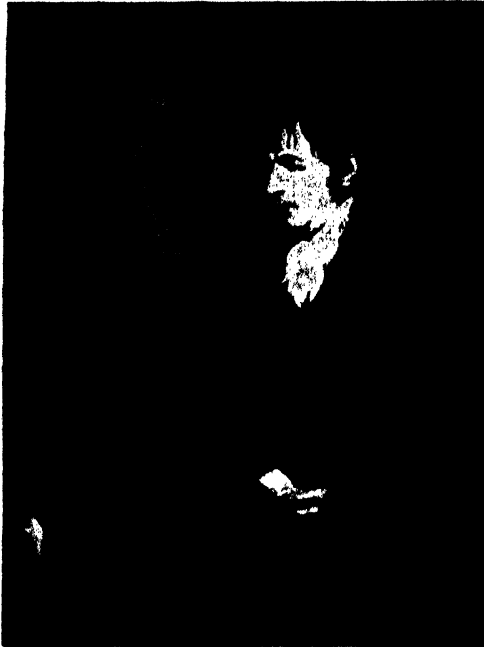
devouring some and driving the rest ashore. The Porpoise, as it "bounced and tumbled," used to be regarded as the herald of dirty weather. Porpoise flesh was once in high esteem even at the royal table and, erroneously supposed to be fish, was a not uncommon dish during Lent eaten with mint sauce, or roasted or stewed with blanched almonds or onions, or in the form of pudding.

Porpora, NICCOLA ANTONIO, composer, was born in Naples on August 19th, 1686, and studied music under Gaetano Greco and Francesco Mancini. Though his first two operas—*Basilio*, produced at Naples, and *Berenice*, produced at Rome—were successful, he achieved fame as a teacher of singing, his gift in this direction amounting to genius. The greatest singers of his day (including Farinelli) owed everything to him. He taught in different European cities, but his visits to England (1729 and 1734) were unfortunate, as he was induced to pose as a rival to Handel. At Vienna he gave lessons to little Joseph Haydn in 1754. He returned to Naples in 1759 and died in poverty in 1787, his last opera, *Camilla*, being a failure. His sacred compositions possess higher qualities than his operatic and his work, while always masterly, was more notable for its technical excellence than for depth of feeling.

Porrigio, or IMPETIGO, a skin disease characterised by an eruption of small pustules, followed by rough, thick crusts. It consists either of a few scattered spots or considerable areas may be affected. The face—especially the mouth, nose and chin—is the usual situation, though the back of the head and the scalp generally may also be involved. When the spots break they discharge a fluid that forms yellowish scabs, easily becoming brown or black from dirt. When the crusts are detached they leave a raw discharging spot which, however, soon heals. The disease is contagious and spreads from one part of the body to another through scratching. Children infect one another by wearing each other's hats or using the same towel. As the disease is an inflammation of the hair roots, when it appears merely in the form of isolated spots it may be cured by extracting the hairs by the roots. Otherwise the hair must be cut short and the scabs removed by carbolised oil or bread-and-water poultices and the parts washed, night and morning, with warm boracic acid lotion and a zinc, sulphur, or dilute nitrate of mercury ointment be then applied. Weakly children should take a teaspoonful of cod-liver oil and steel wine thrice a day.

Porson, RICHARD, Greek scholar, was born at East Ruston, Norfolk, England, on December 25th, 1759. He was sent to Eton, whence he proceeded to Cambridge in 1778. He soon graduated and obtained a fellowship, which lapsed after seven years in consequence of his declining to take holy orders. In 1792 he was elected professor of Greek at Cambridge. In 1794 he published an edition of *Æschylus* and in 1797 one of the *Æschylus* of Euripides and these were followed by other admirable works. His Supplement to the preface in the second

edition of *Hecuba* (1802) is thought to be his finest single piece of criticism. He had no equal as a Greek scholar and his notes are marvellously



RICHARD PORSON.

(After the Painting by Kirkby, Trin. Coll. Cambridge.)

erudite and acute. His memory also was prodigious. In 1806 he was appointed librarian to the London Institution at a yearly salary of £200. He died in London on September 25th, 1808, and was buried in the Chapel of Trinity College, Cambridge. His intemperance was partly due to the use of alcohol for insomnia and partly was the result of slavery to a prevailing habit in the social life of his time.

Portadown, a town of county Armagh, Ireland, on the Bann, 25 miles S.W. of Belfast. A stone bridge across the river gives access to the suburb of Edenderry. About a mile from the town the Bann is joined by the Newry Canal and Portadown is thus placed in water communication with Newry and, *via* Lough Neagh, with Belfast. It is an important agricultural centre, the surrounding district being fertile. The manufactures include linen, cambric and sheeting. The public buildings comprise a handsome Town Hall, besides several churches and chapels and charitable institutions, while there is a commodious market-place. Pop. (1901), 10,046.

Portage. In the United States and Canada when, owing to a fall or rapids, a river has ceased

to be navigable, the canoes or boats had to be carried past the obstruction. This was called a portage, from the French *porter*, "to carry." Sometimes portage was the speediest means, not only of surmounting physical difficulties, but of passing from one stream or lake to another. Portage was very customary among the Red Indians and the backwoodsmen before North America was opened up, but the canalisation of frequented rivers and lakes has rendered it practically obsolete, save among small pleasure parties. Memory of the old state of things survives in many place names, such as Portage City in Wisconsin, Portage Lake in Michigan and Portage la Prairie in Manitoba.

Portal Vein. [LIVER.]

Portarlington, a town of King's County, Ireland, on the left bank of the Barrow, 40 miles S.W. of Dublin. It is a residential quarter and in the vicinity are many mansions of noblemen and gentry. At Arlington House School little Arthur Wellesley, who was to become in due course Duke of Wellington, is said to have received the rudiments of his education. St. Paul's Church (re-erected in 1857) is interesting as being founded by the Marquis de Ruigny (Lord Galway) for his French Protestant followers, William III. having granted him the lands forfeited by Henry Bennet, Lord Arlington (1618-85), a member of the Cabal ministry. Service was formerly held in the French language, but the English has replaced it for many years. Pop. (1901), 2,360.

Port Arthur, or LU-SHUN-KOW, a fortress at the extremity of the peninsula of Liaotung, Manchuria, China. It is said to have been named after the captain of a British man-of-war engaged in a coast survey about the middle of the 19th century. Captured by the Japanese in 1894, it was leased to Russia in 1898 along with the adjoining port of Talienwan. The duration of the lease was for twenty-five years, but might be extended by mutual agreement. Though the place is small, it is naturally almost impregnable and is very strongly fortified. In the Russo-Japanese War (1904) Port Arthur was invested, and after a lengthy and determined resistance, capitulated on January 2nd, 1905, after a siege of 328 days. The feat of its capture (and no less of its resistance) will long remain noteworthy in military annals.

Portcullis, an instrument of mediæval fortification, used to defend the door of a castle, town or other fastness, against battery from without. In form it somewhat resembled a harrow and the bottom was provided with spikes. It was made to slide in vertical grooves in the jambs of the entrance-gate, or might be dropped from above by means of chains, by which also it could be raised. There might be more than one portcullis in an entrance-passage. The iron upright bars were pointed at the foot, the better to crush whatever the grating might fall on. The device originated in the 12th century and is believed to have been invented in Italy.

Port Darwin, or PALMERSTON, the capital of the Northern Territory of South Australia, on the eastern shore of Port Darwin inlet, 1,973 miles N.N.W. of Adelaide. It is the terminus of the submarine cable from Java and the overland telegraph from Adelaide. It has a splendid harbour and is in railway communication with Pine Creek, 146 miles to the south-east. Government House and the Town Hall are the principal buildings. An experimental nursery garden has been established. The inhabitants are mainly engaged in the distributing trade, the port being the centre of the Northern Territorial commerce. Pop. (estimated), 2,500

Port Elizabeth, a seaport of Cape Colony, South Africa, about midway between Cape Town and Durban. It stands upon the steep coast of Algoa Bay near the mouth of the Zwartkop river. Founded in 1820, it rose to considerable prosperity as the chief emporium of trade with the east coast and the development of railways has added to its importance. It has a Town Hall, provincial hospital, churches, college, library, museum and the Grey Institute; there are two parks and several squares; two piers protect the roadstead and water is supplied by an aqueduct. Gold, wool, ostrich feathers, hides and diamonds are the staple exports. Pop. (1904), 32,959.

Porteous Riots took place in Edinburgh in 1736. They had their origin in the trial of two persons, named Andrew Wilson and George

upon the mob, some of whom were killed. Porteous was found guilty of murder and condemned to death, but was respited by Queen Caroline. On the 7th of September a well-organised body of men seized him and hanged him. None of the ring-leaders was caught, but the Government was alarmed and at first heavy punishment was passed on the city. This was afterwards reduced to disqualification of the Lord Provost from holding any other office in the kingdom, the city being also required to pay £2,000 to the widow of Porteous. Sir Walter Scott has utilised the incident in *The Heart of Midlothian*.

Porter, ANNA MARIA, novelist, was born in Durham, England, in 1780, and was educated at Edinburgh. Before she was twenty she had published several tales anonymously and, in 1803, the *Fair Fugitives*, a musical entertainment, was brought out at Covent Garden, though without success. In 1807 she published her best story, *The Hungarian Brothers*, which was popular at home and abroad. Her other well-known stories were *Don Sebastian* (1809) and *The Knight of St. John* (1817), which was the last book read aloud by Prince Leopold to Princess Charlotte the day before her death. She went in 1832 with her more famous sister Jane to pay a visit to a brother in Bristol, where she died on September 21st of that year.

Porter, DAVID, naval officer, was born at Boston, Massachusetts, on February 1st, 1780. Entering the United States navy, he was wounded



PORT ARTHUR, MANCHURIA.

Robertson, who had robbed the custom-house at Pittenweem in Fife. They were condemned to death and during their presence in the Tolbooth Church on the Sunday before execution, Wilson seized the guards and enabled his comrade Robertson to escape. Wilson, who was the innocent cause of Robertson's failing to escape on a previous occasion, was hanged and his execution gave rise to a serious riot, during which Captain John Porteous of the City Guard ordered his men to fire

while fighting with pirates at Santo Domingo (1799). Four years later his vessel was captured in Tripoli and he was imprisoned for eighteen months. During the naval war of 1812 with Great Britain his vessel, the *Race*, played havoc with British shipping, but he was at last overpowered by the *Phoebe* frigate and a sloop in Valparaiso harbour (1814). "We are unfortunate, but not disgraced," he wrote to the Government. David Glascoe Farragut, afterwards the first admiral of the

United States navy, was a midshipman on the *Essex*. After acting as a naval commissioner from 1815 to 1823, Porter commanded an expedition against pirates in the West Indies and later became commander-in-chief of the Mexican navy in the war against Spain. He was next employed in the diplomatic service and died on March 3rd, 1843, at Constantinople, where he was United States minister.

Porter, DAVID DIXON, admiral, son of the preceding, was born at Chester, Pennsylvania, on June 8th, 1813, and was educated at Columbian College, Washington. He entered the United States navy in 1829 and was in command at Vera Cruz and other points in the war with Mexico. Afterwards he was engaged in coast survey and latterly was in charge of the Californian mail steamers. When the Civil War broke out he was given the rank of commander and it was to him that the forts at New Orleans surrendered. In 1862 he became commander of the Mississippi squadron, and his brilliant and daring strategy at Vicksburg, in co-operation with General U. S. Grant, ensured the fall of the town. He was appointed rear-admiral in 1863 and next year was transferred to the North Atlantic Blockading Squadron which bombarded and captured Fort Fisher in North Carolina (1865). He was made vice-admiral in 1866 and succeeded Farragut as admiral in 1870. He died at Washington on February 13th, 1891. He was the author of several works, amongst them *The Life of Commodore David Porter* (1875); two novels, *Allen a Dare* and *Robert le Diable* (1885) and *Harry Marline* (1886); and a *History of the Navy in the War of the Rebellion* (1887).

Porter, ENDYMION, cavalier, was born in 1587 and brought up in Spain. When he returned to England he entered the service of the Marquis, afterwards Duke, of Buckingham. His knowledge of Spain and the Spanish language rendered him invaluable in the State business then going on and the question of Prince Charles's suggested alliance with the Infanta. He held the post of groom of the bedchamber to the Prince and retained it after Charles's accession. He represented Droitwich in the Long Parliament and supported his royal master in and out of season. He voted against the attainder of Strafford and was supposed to be engaged in the "Popish plot" against the liberties of England. On all these accounts he had incurred the enmity of the Parliamentarians. He withdrew to the Continent at the end of 1645, but was permitted to visit England in 1648 to settle his affairs. His health then gave way and he died in London on August 20th, 1649. During the period of his prosperity he was an enlightened patron of letters and art.

Porter, JANE, novelist, the daughter of an army surgeon, was born in Durham in 1776 and was educated, along with her sister, Anna Maria Porter, in Edinburgh. The family removed to London in 1803 and Jane at once began to write tales. Her first book, *Thaddeus of Warsaw*, appeared in the same year. It was dedicated to Sir Sidney

Smith and had a great vogue, Kosciuszko conveying his admiration of the story to the author at a later date. Her most popular novel, *The Scottish Chiefs* was published in 1810; it dealt with the fortunes of Sir William Wallace and was an immense success, Napoleon paying it the compliment of proscription. Her attempts at dramatic work however, were dismal failures, *Switzerland*—produced at Drury Lane in 1819, with Edmund Kear and Henry Kemble in the cast—being so promptly condemned that the manager had to come to the front and announce its withdrawal. Her later books did not repeat the successes of her first two and she seems to have experienced at times pecuniary difficulties. She died at Bristol on May 24th, 1850.

Porter, NOAH, President of Yale, was born at Farmington, Connecticut, on December 14th, 1811 and was educated at Yale. From 1836 to 1846 he was pastor of several Congregational churches being appointed in the latter year to the chair of moral philosophy and metaphysics at Yale. In 1871 he became President of the College, holding the post till 1886 concurrently with his professorship. He received from Edinburgh University the degree of LL.D. in 1886 and died at New Haven on March 4th, 1892. His principal works comprised *The Human Intellect* (1868), *Books and Reading* (1870), *Sciences of Nature versus the Science of Man* (1871), a review of Herbert Spencer's philosophy *The Elements of Moral Science* (1885), *Life of Bishop Berkeley* (1885) and *Kant's Ethics* (1886).

Porter, SIR ROBERT KER, painter and traveller was born in Durham, England, in 1777, and spent his boyhood in Edinburgh, whither his mother and his two sisters, Jane and Anna Maria Porter, had removed after the father's death. Robert developed a talent for drawing and Benjamin West procured him admittance to the Academy Schools. He evinced a partiality for historical pictures on the grand scale and especially for battle-pieces. His experiences as a scene-painter at the Lyceum Theatre gave him a hint for a panorama, and his "Storming of Seringapatam," 150 feet long, and painted in six weeks, was very popular. He may thus be regarded as the father of the panorama. In 1804 he was appointed historical painter to the Tsar of Russia, but being required to leave the country he visited several German courts, and was with Sir John Moore when he died at Corunna in 1809. He revisited Russia in 1811 and married a daughter of Prince Theodor von Scherbatoff in the following year. Visiting England in 1813 he was knighted by the Prince Regent. Four years later he began his travels in Persia, of which he gave a valuable account in his *Travels in Georgia, Persia, Armenia, Ancient Babylonia* (1821), and in 1821 was appointed British Consul in Venezuela, a position he filled with advantage for fifteen years. He died suddenly in St. Petersburg, where he had gone to visit his married daughter, on May 4th 1842.

Port Erin, a watering-place in the south-west of the Isle of Man, 4½ miles W. of Castletown. I

is picturesquely situated at the head of an apparently land-locked bay which extends from Mull Hill or The Castle to Bradda Head, the sweep measuring two miles. The breakwater and concrete landing-pier built out from The Castle with the intention of providing a harbour of refuge has been almost completely wrecked by the sea. Near the sandy beach at the head of the bay is the site of a religious house and St. Catherine's Well, once resorted to for its medicinal properties. The fisheries constitute the only industry, but the town is in growing repute as a watering-place, and it contains a Biological Station, with laboratory and aquarium, which was opened in 1892 in connection with the Liverpool Marine Biological Society. The Calf of Man is about two miles distant to the south-west. Pop. of parish of Rushen, in which Port Erin is situated, (1901), 3,278.

Porteus, BEILBY, bishop, was born in York, England, on May 8th, 1731, and was educated at York, Ripon, and Christ's College, Cambridge. He became rector of Lambeth in 1767, master of the Hospital of St. Cross, Winchester, in 1769, Bishop of Chester in 1776, and finally of London in 1787. He acted diligently with the Evangelical party and advocated the better observance of religious holidays. He is best known by his *Summary of the Principal Evidences for the Truth and Divine Origin of the Christian Revelation* (1800), which passed into many editions and has been used as a textbook in numerous schools. He died at Fulham on May 8th, 1808.

Port Glasgow, a seaport of Renfrewshire, Scotland, on the south shore of the Firth of Clyde, 20 miles W.N.W. of Glasgow. The principal buildings are the Town House, in the Classic style, erected in 1815, with a clock tower and spire 150 feet high; the public hall; the Moffat Library, built in 1887 out of portion of a bequest left by James Moffat, a merchant of the town, and the Carnegie Park Orphan Homes, founded by the same bequest. The industries include shipbuilding yards, saw-mills, engineering works, iron and brass foundries, roperies and sailcloth-making. The town was established in 1668 by the magistrates of Glasgow, as a harbour for their city (hence its name), but the scheme ultimately fell through when the Clyde was deepened, and the harbour was actually constructed in the heart of Glasgow. The shipping trade at Port Glasgow, however, is still important, ample facilities for it existing in abundant quayage and wet and graving docks. On the slopes to the east of the town are the ruins of Newark Castle, an ancient seat of the Maxwells. Pop. (1901), 16,840.

Portland, a city and port in Maine, United States, situated on Casco Bay, 108 miles N.E. of Boston. Standing on a peninsula and possessing an excellent harbour, seldom closed by ice, it is an important centre of trade and passenger traffic between Europe and North America, and also between the neighbouring ports. Founded in 1632, it has developed into a fine city, with broad streets and handsome public buildings. The principal structures include the City Hall, the United States

Marine Hospital, the Maine General Hospital, the Public Library, the Observatory and the Portland Natural History Society, besides the Episcopal and Roman Catholic Cathedrals. The industries comprise shipbuilding, meat- and fish-packing, petroleum-refining and manufactures of locomotives, iron forgings, stoves, boots and shoes, paper, matches and textiles. It is a favourite watering-place and many popular seaside resorts have grown up in its vicinity. It was the birthplace of Henry Wadsworth Longfellow. Pop. (1900), 50,145.

Portland, capital of Multnomah county, Oregon, United States, on the Willamette, 52 miles N. by E. of Salem. Though dating only from 1845, it is now a large and prosperous place, owing to its position as the centre of an important railway and steamship system. Wheat, fruit, flour, canned salmon, and lumber are the chief exports; and the imports include most European products required by settlers in the Far West. The manufactures comprise iron ware, woollens, flour, furniture, rope, paints, oils, soap, carriages and beer. It is the seat of the law and medical faculties of the University of Oregon, the Portland University, Portland Academy and St. Michael's College. Pop. (1900), 90,426.

Portland, ISLE OF, a peninsula, usually called an island, on the south coast of Dorsetshire, England, 4 miles S. of Weymouth, united to the mainland by Chesil Bank, a long ridge of pebbles and shingle which extends in a north-westerly direction as far as Abbotsbury. Portland has an area of 2,984 acres, is 4½ miles long from north to south and 1½ miles wide, its highest point, the Verne, is 496 feet above the sea, and the seaward extremity is known as Portland Bill. The soil is fertile and the sheep bred here are noted for mutton; but the beds of Oolitic Portland stone—which furnished the material for the Banqueting House in Whitehall, St. Paul's Cathedral and other large buildings in London—are the chief source of prosperity, apart from the business created by the harbour of refuge constructed by convict labour between 1849 and 1872, the famous breakwater being 1½ miles long, 300 feet broad at the base, 120 feet wide at low-water level, and forming a roadstead of four miles in extent. The Isle is strongly fortified, the Verne being crowned with Fort Victoria. The principal buildings are the great Convict Prison (1848), where the prisoners are employed in quarrying and loading the stone; the Castle erected in 1520 by Henry VIII.; Pennsylvania Castle, built by a grandson of William Penn, and Bow and Arrow Castle, on a crag 300 feet high, said to have been erected by William Rufus. Off Portland Bill flows a strong and dangerous current called the Race, between the Shambles Bank and the shore. Pop. (1901), 15,262.

Portland Vase, called also the BARBERINI VASE, from the fact of its formerly having been deposited in the Barberini Palace, is a Greek cinerary urn of dark-blue glass with white enamel reliefs. It is ten inches high by seven inches round, and has two handles, and was discovered at Monte

del Grano, near Rome, about the middle of the 17th century. Sir William Hamilton bought it in 1770; it afterwards came into the possession of the Duchess of Portland, and in 1810 the Duke of Portland lent it to the British Museum, where it is still to be seen. It was broken in 1845 by a drunken medical student, but was skilfully repaired.

Port Louis, the capital of Mauritius (an island in the Indian Ocean belonging to Great Britain, formerly known as *ISLE DE FRANCE*), situated on the north-west coast at the head of an inlet about a mile long. It is protected by several fortifications and a citadel. In consequence of its high mean temperature (80° F.) it is not very healthy. The principal buildings are Government House and the Protestant and Roman Catholic Cathedrals, none of which has much architectural merit. Being the chief seaport, the trade (both import and export) is considerable, the harbour being capacious and the quays commodious. The hurricane of 1892 wrought serious damage in the town, a third of the houses having been destroyed. Pop., 52,740.

Portobello, a watering-place on the southern shore of the Firth of Forth, Midlothian, Scotland, 3 miles E. of Edinburgh, with which it has been incorporated for municipal purposes since 1896. It is said to have received its name from a sailor who built a cottage here and called it after the South American Puerto Bello, in the capture of which by Admiral Vernon in 1739 he had borne a part. The town, though almost wholly residential, has manufactures of bottles, bricks, pottery, tiles and paper, while at Joppa, at the extreme eastern end, there are salt works. There is a beautiful expanse of sands (once the scene of yeomanry reviews), bordered by a promenade along the whole front nearly 1½ mile long. Owing to its proximity to the capital, with which there is constant communication by tram and train, the town is a popular resort. Pop. (1901), 9,200.

Porto Rico, or **PUERTO RICO**, one of the West Indian Islands, lying 70 miles E. of Hayti, and having an area of 3,550 square miles. Oblong in shape, it measures 108 miles from east to west and 37 miles from north to south. It includes the island of Viequez, lying off the east coast. The island is divided by a mountain ridge into two unequal parts, the northern being the larger. The highest point is El Yunque, in the north-eastern quarter, 3,600 feet above the sea. The number of streams is exceptionally large for the area, and the soil is therefore well watered and fertile. The lower grounds yield sugar, coffee, cacao, tobacco, cotton, rice, maize, yams, oranges, cocoa-nuts and other tropical fruits in abundance, and the mountain forests are rich in valuable timber. Gold, iron, copper, coal and salt occur, but the last-named alone is extensively worked. Cattle-breeding is conducted on a large scale. The chief towns are San Juan Bautista, or San Juan (27,000), the capital, on the north coast, founded by Ponce de Leon in 1511; Ponce (42,389), about three miles inland on the south coast, and Mayaguez on the west coast. Discovered by Columbus in 1493 and

occupied in 1511, Porto Rico was in Spanish hands until December, 1898, when, on the conclusion of the Spanish-American war, it was ceded to the United States. Pop. (1900), 953,243.

Portpatrick, a seaport of Wigtownshire, Scotland, 7 miles S.W. of Stranraer. From 1662 to 1849 it was the mail-packet route to Ulster, Donaghadee in Ireland being only 21 and Belfast 36 miles distant. With a view to developing the service a great harbour was begun in 1821 from John Rennie's designs, but after £500,000 had been spent upon the works they had to be abandoned, as the situation had proved to be too much exposed to the periodical violence of the south-western gales. Since then the trade has fallen off, but the town has gained a growing reputation as a watering-place owing to its picturesque situation and fine climate. Pop. (1901), 1,190, much increased during summer.

Port Royal, a Cistercian abbey founded in 1204 on the Yvette, near Marly, 8 miles S.W. of Versailles. It had the privilege of offering a retreat to such lay persons as desired to withdraw from the world for a period without taking binding vows. Discipline having relaxed in course of time, in 1608 Marie Arnauld, La Mère Angélique, completely reformed the institution and a few years later a branch was established (under the same name) in Paris, which under the influence of the Abbé de St. Cyran became the headquarters of Jansenism (as the movement against the Jesuits was called after its author, Cornelius Jansen, Bishop of Ypres). Port Royal des Champs (as the mother house was styled for the sake of distinction) was then occupied by Antoine le Maître and a few companions, who largely devoted themselves to teaching in the Petites Écoles which they started both here and in Paris and for which they prepared a series of educational textbooks of permanent value. But the Jesuits, thirsting for vengeance, induced Louis XIV. to order the schools to be abandoned and the inmates of both houses to be dispersed (1661). A peace was patched up in 1669 which was observed till 1705 when, the nuns proving inflexible, Port Royal des Champs was suppressed in 1708, the nuns—many of them aged sisters—were forcibly removed, the buildings were razed in 1710 and next year the dead (nearly 3,000 bodies, it is said) were exhumed and buried elsewhere. The Parisian house survived till 1790.

Port Royal, a seaport of Jamaica, at the extremity of the Palisades, a narrow spit that extends westward for several miles and forms a natural breakwater protecting the harbour of Kingston. Once the finest town in the West Indies, it is now a small and shabby place, though it is still a naval station and contains Admiralty House with beautiful gardens, and well-fitted shops and sheds for the repairing of ships of war. It was shattered by earthquake in 1692 (some of the ruins being visible yet beneath the water in clear weather), a calamity which was in a double sense its undoing. Burned down in 1703, devastated by hurricane in 1722, again burned down in 1815 and again swept by tornado in 1880, it is hardly surprising that its former

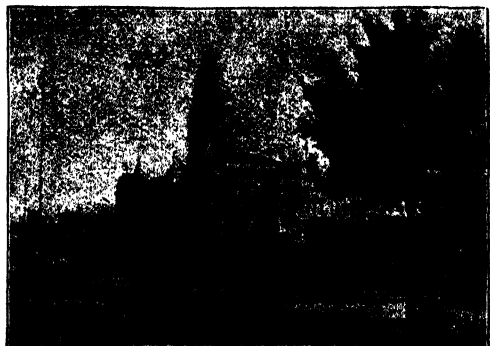
status could not be maintained. It sustained further damage in the earthquake of January 14th, 1907. Pop. (estimated), 1,500.

Portrush, a watering-place of county Antrim, Ireland, 7 miles N.N.E. of Coleraine. The town is rapidly acquiring a great vogue as a holiday resort in consequence of its healthy climate, good bathing facilities and fine golf course. Its proximity to Giant's Causeway, with which it is in communication by means of an electric tramway, 8 miles long, opened in 1883 and the first of its kind in Ireland, also attracts large numbers of tourists. In the vicinity are the grand ruins of Dunluce Castle almost wholly covering a huge basaltic cliff and recalling, from their situation, the more extensive and still nobler remains of Dunottar Castle on the far distant coast of Kincardineshire. Bushmills, famed for its whisky, is in Dunluce parish. Pop. of Portrush (1901), about 2,000.

Port Said, a seaport of Lower Egypt, on the Mediterranean, at the northern end of the Suez Canal, to which it owes its existence. It was built on the west side of the Canal on the barren uninviting strip of land which separates Lake Menzaleh from the sea and was named after Saïd Pasha, a patron of Ferdinand de Lesseps. It is well laid out, fresh water being supplied from the Sweetwater Canal at Ismaïlia, but the native quarters are mean. It has no industries, being dependent upon the Canal traffic, but it is a coaling station and the docks employ many hands. Pop. (estimated), 42,300.

Portsmouth, the naval arsenal of England, on Portsea Island, Hampshire, 64 miles S.W. of London. Within the municipal limits are Portsea on the north, Landport on the east, and on the south-east and sea-front Southsea, a fashionable watering-place. Portsmouth is fortified on every side by a perfect system of works. A narrow channel separates it from Gosport and Haslar to the west, and opens out into the harbour, which extends for four miles inland. The largest vessels can enter the port at any state of the tide, and there is ample accommodation for the whole British fleet. To the south lies the roadstead of Spithead, where, on August 29th, 1782, the *Royal George* went down with Admiral Kempenfeldt and nearly 1,000 men; the scene also of the many splendid naval reviews that have aroused the world's admiration. The docks cover 290 acres, and have every requisite for building, fitting, and repairing ironclads of the largest size. On the extended dockyards nearly three millions have been spent. The town received its first charter from Richard I. and became a naval station of importance in the 13th century, but its present development can be traced back only to 1544. The principal buildings are the church of St. Thomas Becket (1173), said to possess one of Father Smith's organs; the Garrison Chapel, originally part of St. Nicholas's Hospital (1212), in which Charles II. married Catherine of Braganza; the magnificent Town Hall with an imposing clock tower, built at a cost of £140,000 and opened in 1890 by Edward VII., then Prince of Wales; the Grammar School (1732); the Free Library; the

Royal Naval Club; the Roman Catholic Cathedral; the Royal Hospital and Government House. Victoria Park and numerous recreation grounds and open spaces are of comparatively modern construction. Excepting brewing, the industries are almost wholly confined to the endless activities and requirements of the different branches, docks, basins, factories and stores of the royal dockyard. In a house in High Street, still standing, the Duke of Buckingham was assassinated by John Felton



PORTSMOUTH TOWN HALL, FROM VICTORIA PARK.

(Photo: Chester Vaughan & Co., Aclou.)

on August 23rd, 1628. Of distinguished natives should be mentioned Charles Dickens, George Meredith, Jonas Hanway, Isambard Kingdom Brunel, Sir Walter Besant, John Pounds and Vicat Cole. Pop. (1901), 189,160.

Portsmouth, a seaport of Rockingham county, New Hampshire, United States, at the mouth of the Piscataqua, 57 miles N.N.E. of Boston. Picturesquely situated and quaint of aspect, it is in much repute as a summer resort. Though the harbour is excellent, always ice-free and open to vessels of large tonnage, there is little trade. The United States navy yard at Kittery on the north side of the river, in the state of Maine, is commonly called Portsmouth yard. Besides shipbuilding, the chief industry, and brewing, there are manufactures of cotton, hosiery and boots and shoes. Settled in 1623 it was the capital of the state till 1807, when that rank was conferred on Concord. The *Ranger*, the first ship to carry the Stars and Stripes and afterwards commanded by Paul Jones, was built at Portsmouth in 1777 for Congress. The *New Hampshire Gazette*, the oldest newspaper in the United States, was established here in 1766. Pop. (1900), 10,637.

Portsmouth, the capital of Scioto county, Ohio, United States, at the confluence of the Scioto with the Ohio, about 90 miles E.S.E. of Cincinnati. It is a rising city, owing to its position at the southern terminus of the Ohio and Erie Canal, and its connection by rail with the mineral and agricultural regions of the states of Ohio and Kentucky.

It has iron-smelting works, foundries, rolling-mills, saw-mills, flour-mills and breweries, besides manufactures of boots and shoes, stoves, furniture, nails and machinery. It was laid out in 1803 and its charter dates from 1814. Pop. (1900), 17,870.

Portsmouth, the capital of Norfolk county, Virginia, United States. It is one of the best harbours on the Atlantic coast, being situated on the west bank of the Elizabeth, opposite Norfolk, about 80 miles S.E. of Richmond. The Gosport navy yard, with its large dry dock and hospital, is established here. There is a considerable export trade in cotton, timber, pig-iron and agricultural produce. It was founded in 1752. Pop. (1900), 17,427.

Portugal, the most westerly kingdom of Europe, and geographically an integral portion of the Iberian peninsula. It is bounded on the north and east by Spain, on the south and west by the Atlantic. Lying between 36° 56' and 42° 10' N., and 6° 15' and 9° 30' W., it is 362 miles in length and 140 in breadth, has a coast-line of 473 miles, and contains about 36,000 square miles, not reckoning the Azores and Madeira. *Tras-os-Montes*, in the north-east, is the only province not touched by the sea. The mountains are in effect continuations of systems in Spain. In the north the principal heights are *Serra do Gerês* (4,815 feet), *Serra de Marão* (4,665) and *Serra da Nogueira* (4,500). Towards the centre is the granitic mass of *Serra da Estrella* (6,540), the loftiest range in Portugal. In the extreme south-west the *Serra de Monchique* reaches a height of 2,963 feet. The three chief rivers—the Douro, Tagus and Guadiana—rise in Spain, but flow through Portugal to the Atlantic. The well-known capes are *Mondego*, *Carvoeiro*, *Roca*, *Espichel*, *Sines* and *St. Vincent*. There are no considerable lakes, though tarns are numerous in the hills. The climate is singularly temperate and equable, the mean average temperature at Oporto and at Coimbra in January showing a variation of only twenty degrees from that of July. There are many valuable medicinal springs. The minerals include copper, lead, iron, zinc, gold, salt and coal, but are not generally worked owing to the want of fuel and of cheap transport. There are extensive forests of oak, chestnut, pine and cork trees, and in the south the date, fig and almond thrive. The grape-vine is of great importance and the orange, lemon, olive and mulberry are also cultivated. The leading crops are maize, rye, wheat, barley, oats, hemp and flax. The industries include ship-building, distilling, tanning, and manufactures of silks, cottons, lincens, woollens, pottery, porcelain, earthenware, jewellery, paper, tobacco, lace, gloves, hats, machinery, arms, cutlery, foundry products, tinware, glass, soap, cork and confectionery. The fisheries are valuable, sardines and tunny being largely exported. The present system of government, hereditary and constitutional, dates from 1826, though it was modified in 1852, 1885 and 1895. The crown is hereditary in the female as well as the male line, with preference to the latter in the event of equal birthright. A cabinet of seven members is chosen by a prime minister

nominated by the king, who, in critical cases, is empowered to seek the advice of a privy council of twelve members who are nominated for life. There are two legislative chambers—the House of Peers and the House of Commons, conjointly called the *Cortes Geraes*. The members of Parliament are elected for four years and the annual session lasts for three months. The sovereign cannot veto a law that has twice passed both Houses. The army is raised partly by conscription and partly by voluntary enlistment. The Roman Catholic is the established religion, but the power of the Church was broken when, in 1834, the monasteries were dissolved and their possessions appropriated by the State, and the priests have no control over education, which in theory is compulsory. There are polytechnics and schools of science and art chiefly in Lisbon and Oporto, a Conservatorio for music and the dramatic art at Lisbon and a University at Coimbra. The capital, Lisbon, at the mouth of the Tagus, has a population (1900) of 356,009 and Oporto, at the mouth of the Douro, the only other large town, 167,955. The population of Portugal in 1900 was 5,016,267 or, including the Azores (256,291) and Madeira (150,574), 5,423,132.

History. Portugal, the Lusitania of the Romans, may be said to have begun its career as a nation about the end of the 11th century. In 1094 Alfonso VI. of Castile conferred it upon Henry of Burgundy as a dependent fief, its then limits being from the Tagus to the Minho in the north. By Henry's son, Alfonso I., it was elevated into an



SKETCH MAP OF PORTUGAL.

independent kingdom. The house of Burgundy occupied the throne until 1578, and it was under their rule that Portugal rose to be the chief maritime power in Europe and acquired its very extensive colonies. With the extinction of the Burgundian dynasty an era of decadence began which did not exhaust itself for centuries. Rival

claimants for the throne appeared and in 1580 Portugal was incorporated with Spain. A War of Independence began in 1640 under the Duke of Braganza, who was crowned as John IV., and in 1668, partly owing to British aid, the work of liberation was consummated; but by this time many of the colonies were for ever lost and the nation had suffered grievously in blood and treasure as well as in *morale*. The chief events in the modern history of Portugal are those connected with the Peninsular War and the loss of Brazil, which became independent in 1822. At the close of the Peninsular War Portugal adopted a constitution modelled upon that of Great Britain. It was in the war waged on behalf of Pedro IV. against Miguel, who had violated his oath and played the despot, that the Portuguese fleet was practically destroyed off Cape St. Vincent. The ambition of Portugal to take part in the colonisation of Africa received a serious check in 1889, when she was forced by Lord Salisbury to abandon her claims to Nyasaland. Following, however, an interchange of visits between Edward VII. and Dom Carlos—the latter at the end of 1904—a sentiment of *rapprochement* set in between the peoples of Great Britain and Portugal.

Ethnology. The Lusitani, the earliest known inhabitants of Portugal, appear to have been a mixed Ibero-Celtic people, who later became further modified by Italian settlers during the empire, by Teutons (Visigoths and Swabians) at the time of the northern migrations, and south of the Tagus by the Moors (Arabised Berbers), who remained masters of Algarve till the middle of the 13th century. A strain of black blood has even been introduced, partly from Africa during the 16th century (when from 10,000 to 12,000 slaves were annually imported), partly from Brazil, whence numerous half-castes arrived during the 19th century. But all these mixtures, to which must be added many tens of thousands of Galicians in recent times, have not resulted in a fine race; for the majority of the inhabitants are a small, somewhat weedy people, with irregular features and lack of expression. In some districts, however, the women are noted for their light complexion, bright eyes, vivacity, and graceful carriage. They are courteous, friendly, and considerate towards each other, less cruel than their Spanish neighbours, but perhaps more superstitious and more prejudiced against foreigners. Despite the prevailing ignorance, the majority even of the peasantry express themselves with remarkable ease and correctness in the national language, which is a distinct member of the Romance (Neo-Latin) family, differing greatly from Spanish, highly expressive and idiomatic and noted especially for its contracted forms and nasal utterance. The literature boasts of numerous elegant, if not original, writers in prose and verse, including at least one great name—Luiz de Camões, or Camoëns (1524-79), author of the *Lusiad*.

Portuguese Man-of-War, the popular name of *Physalia*, which is common in tropical waters, where it floats passively on the surface.

Port Wine, a Portuguese wine which takes its name from Oporto, since the district in which it is produced consists of a mountainous region along the Douro, extending 12 miles inland, and beginning a few miles above Oporto, with which it is connected by railway. Its natural colour varies from pale rose to deep red, though it is often coloured artificially, and is much fortified with brandy for the British market, thus becoming a very different wine from what one finds it abroad. The special qualities of this wine are the outcome of the soil and climate. After the autumn vintage the wine is kept in vats till spring, and is then transferred in casks to Oporto, where it is fortified. The brandy departs with age and the wine then becomes of a tawny colour. In the 16th century it became known in England; a British factory was founded in Portugal and obtained such a monopoly that the Marquis of Pombal in 1756 made a successful effort to break it down. The Peninsular War doubtless contributed to making port popular in the United Kingdom.

Poseidon. [NEPTUNE.]

Posen, a province of Prussia, bounded on the N. by West Prussia, on the E. by Russian Poland, on the S. by Silesia, and on the W. by Brandenburg, with an area of 11,180 square miles. Some portions are very fertile, producing wheat and other cereals, potatoes, hops, beet, tobacco, and even grapes, whilst the wild pastures feed many cattle and sheep. The rivers Netze, Warthe, and Odra drain into the Oder, and the Vistula bounds the north-eastern frontier. Originally a district of Poland, it was acquired by Prussia in 1772 and 1793, and the treaty of 1815 confirmed the annexation. Pop. (1900), 1,887,275.

Posen, capital of the foregoing province, on the Warthe, 90 miles N. of Breslau. It is a first-class fortress and is fortified completely on the modern system. The principal buildings comprise the 18th-century cathedral with a beautiful Golden Chapel; the Renaissance Town Hall; the royal palace; the Raczyński Palace and Library; the Kaiser Wilhelm Library and the Mielzynski Museum. The manufactures include machinery, furniture, chemicals, carriages, beer and tobacco. One of the oldest towns of Poland, it became a Christian bishopric in the 10th century. During the Middle Ages it was at the height of its prosperity, but owing to intolerance towards the Protestant part of the community and the troubles of the Thirty Years' War it declined greatly in population and influence. After the partitions of Poland, however, it revived and, despite the somewhat bitter feelings between its Polish inhabitants and the Germans, is now a flourishing community. Pop. (1900), 117,014.

Posilipo, a promontory projecting into the sea on the west of Naples opposite the island of Nisida. It is pierced by the tunnel called the Grotto of Posilipo, which is 2,316 feet long, 22 feet broad, and 89 feet high, constructed about the time of the Emperor Augustus to carry the highway from Naples to Puteoli (Pozzuoli). Near the entrance is

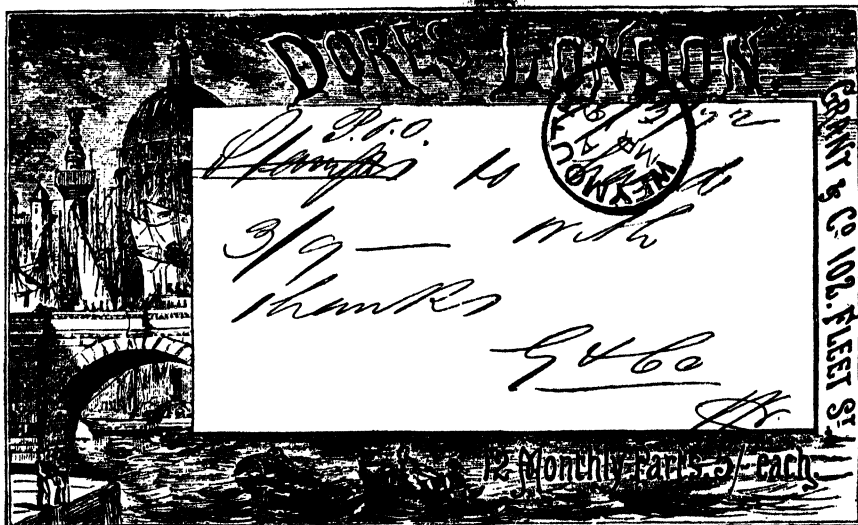
a Roman columbarium or pigeon-house, the so-called tomb of Virgil. A new Grotto was made in 1882-5. Posillipo is derived from Pausilypon, the name of Vedius Pollio's villa which afterwards belonged to Augustus. It was so called from a Greek word meaning "pain-ending," in allusion to the extreme beauty of the scenery.

Positivists, the followers—not very numerous in France, and fewer still in England—of the philosophical principles enunciated by Auguste Comte, whose *Cours de Philosophie Positive* was published in 1830-42. He was comparatively little known in England till George Henry Lewes, in 1846, in his *History of Philosophy*, declared his adhesion to the views of Comte, whom he called the "Bacon of the 19th century." Comte's view of metaphysics was that it was only a stage, and that a faulty one, in the development of human thought. He held that there were three stages in this development: (1) a "theological" stage, in which all phenomena were looked on as the results of the intervention of supernatural agents; (2) the metaphysical, in which they were referred to abstract powers as a cause; and (3) the positive, or scientific stage, in which nothing was looked for beneath uniformity of nature and a universal orderly succession of phenomena. Knowledge he divides into inorganic physics and organic physics. Inorganic physics he subdivides into celestial and terrestrial, subdividing the latter farther into mechanics and kindred branches on the one hand, and chemistry on the other; organic physics includes biology and a new science of sociology, which looks on the individual as a kind of cell or monad in an organic whole, called humanity. All these sciences imply mathematics as a pre-condition, and so the chief divisions fall into a progressive scale, each division implying all the preceding, but taking up a new set of phenomena. The scale is at once a classification of the sciences and the order (on the whole) of their historical development, and an indication of their order in education—viz., mathematics, astronomy, physics, chemistry, biology, sociology. Humanity, to whose service all knowledge is to be devoted, is the one supreme being, for the worship of which Comte established a religion and a new calendar of saints or benefactors of the human race, to whose commemoration different days were to be dedicated. Among his English critics are Harriet Martineau, Richard Congreve (1818-99), his chief English disciple and translator, Herbert Spencer, John Stuart Mill, Professor Huxley, Professor Beesly and Frederic Harrison. Though not accepting Comte's dogmas, Mill found something attractive in the idea of a religion of humanity, as also did George Eliot, who, no doubt, was much influenced by G. H. Lewes. The English Positivist school, however, has affected English political thought considerably. Many include, under the term Positivist, Spencer, Alexander Bain and all who direct scientific attention solely to phenomena and their sequences; but the Positivism of this school of thinkers is not identical with that of Comte, though they, with him, eschew metaphysics as fiction.

Post-Cards, Picture. As its name implies, the picture post-card is an open postal correspondence card bearing an illustration. The ordinary plain form of this postal missive was invented by Dr. Hermann in 1869, and was at once adopted by the Austrian Post Office. Strange to say, there is said to be in existence a card with a picture on it which was sent through the post in 1865, but this, though an exceedingly interesting card, does not officially come under the above heading, as it must have been paid for and posted under letter rates. The invention of illustrated post-cards is claimed by Germany, France and Switzerland; England, contrary to the original idea, having also been among the first to use them. The first public use of the picture post-card was made in France in 1870 in the village of Sillé-Le-Guillaume, where a local stationer published, for the use of an army stationed near by, a postal card bearing drawings of weapons and the arms of Brittany. Examples of these, printed in 1870-1, are still in existence, and reproductions of them were printed by the original publisher, M. Besnardreau, 33 years afterwards (1903). The first known English picture post-card was issued in 1872, by a London publishing firm to advertise Gustave Doré's *London*. It bore a typical view of London printed from a wood-cut, and there is one in the writer's possession bearing the postmark "London, 18 March, 1872." The idea, however, was not followed up, and the "craze" afterwards sprang up in Germany and spread to Switzerland, Italy and France for many years before it caught on in England. The first subject of illustration was a view of some pretty or popular place, some holiday resort, a hotel, a view from the top of a mountain, one of the ideas being to prove that the visitor had been at the place depicted—for the same reason that mountaineers had the name of the peak they had climbed burnt on their alpenstock. Hence, the view post-card was the source, and has always been the mainstay of the custom of sending picture post-cards. Another reason for their popularity is that they are much handier and cheaper than the scrap photographs formerly sold to tourists, so that visitors and travellers in addition to using the cards for correspondence would buy them, as souvenirs of their tour and as attractive pictures of interesting places to show to their friends. But whatever the motive, the fact remains that the picture post-card has undoubtedly achieved a greater and more enduring vogue than any other article of pictorial stationery in the world's history. The idea once started, the illustrations embraced, in addition to views, pictures of prominent persons, reproductions of popular pictures, original humorous drawings, fancy subjects and so on, until there is scarcely any matter of interest of an illustratable nature that has not been exploited by means of post-cards, in the production of which practically every printing and reproduction process has been employed. Collotype, half-tone process, chromolithography, photogravure, real photography, three- and four-colour work, and combinations of litho- and letterpress have all been and are extensively being used in the printing of picture post-cards. In short,

it is no exaggeration to say that the supply of originals (executed by artists or photographers), the reproduction of the design and the printing off of the post-cards have not only practically created a new industry, but have caused a quickening if not an actual revival of trade, both among printers generally and the stationery trade in particular. Some idea of the enormous quantity of picture post-cards used in Great Britain may be gathered from the following statistics—to enumerate the quantities used abroad would require several pages. Taking, then, the ratio of increase of post-cards passing through the Post Office (the great majority of which were picture post-cards) we find for the year ending March, 1902, an increase of 8·2 %; in 1903, 10 %; in 1904, 25 %; in 1905, 16 %; and in 1906, 9 %.

kindly correspondence between friend and friend, country and country. The habit appeals to so many human emotions that no wonder need be expressed at its lasting popularity; for it saves time, more than halves the postage bill, and gives a maximum of pleasure with a minimum of effort. The illustration of the place or scene visited saves the traveller trouble, and is generally better than pages of description. Moreover, the facilities with which the cards can be addressed and dispatched when travelling are so great that people are tempted to buy and post the cards who would never dream of otherwise communicating with their friends. In addition to correspondence uses, the post-card collector forms an important factor in the demand for them: People began by keeping the cards (or



FACSIMILE OF THE EARLIEST-KNOWN BRITISH PICTURE POST-CARD.

The number of cards passing through the Postmaster-General's hands was, for the year 1902, 445 millions; in 1903, 488 millions; in 1904, 613 millions; in 1905, 734 millions; and in 1906, over 800 millions. These figures, however, give but a faint idea of the actual numbers produced in Great Britain and utilised by the public. For not every one is altruistic enough to buy post-cards to send through the post to friends. Many millions are bought to put into the buyer's own collection, or to frame as wall pictures, table stands, or ornaments for the shelves, whilst enormous quantities are used to decorate chocolate boxes, are given away with periodicals, employed as prizes to school children for attendance, and various other purposes; while, again, many millions have been used as advertisements for all sorts of subjects, from railway travelling to a hair-wash. The custom of sending picture post-cards to one's friends having once started inevitably was bound to progress. For its essence is to be a medium of

duplicates) illustrating their latest tour, and subsequently finding them of such interest to themselves and affording such pleasure to their friends, the idea of collecting the cards for their own sakes speedily grew. In addition other subjects and series were collected, pretty much as postage stamps are collected; and in the same way as philatelists specialise in certain countries or issues, so many cartophilists specialise in the subjects which they collect. From this arose the system of exchanging post-cards through the post. Thus a collector in France who wanted the costume cards of Italy would write to an exchanger in the latter country for such cards, offering him in return view-cards of his own locality or types of his own country. Advertisements were placed in various journals announcing the willingness of the advertiser to enter into such relations with those who were willing to exchange card for card. From this and other causes there sprang up the need and desire

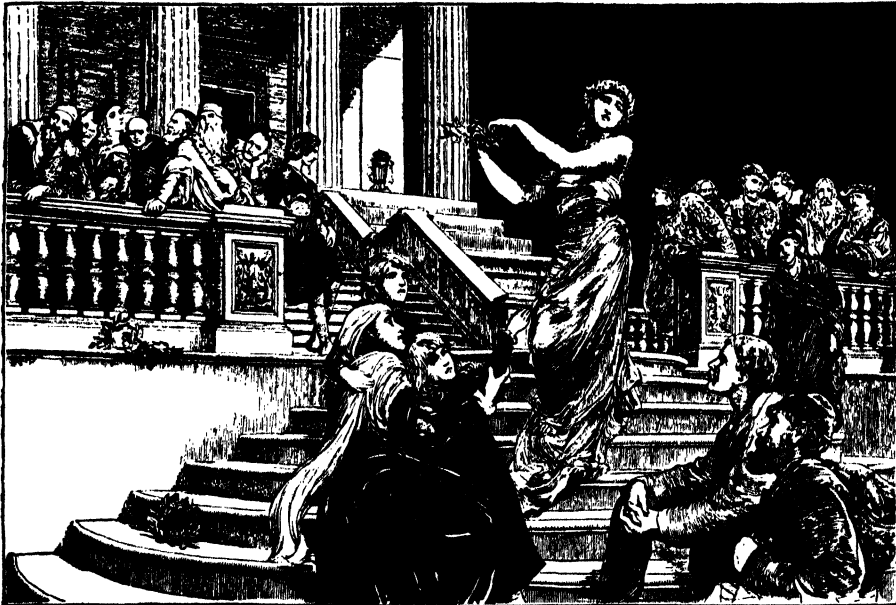
for cartophilic publications, as many as seven post-card journals at one time appearing in France; Germany has several, and in fact there is scarcely a civilised country in the world which has not at some time or other owned its own post-card journal. England was one of the first to adopt and extend the idea, and many monthly magazines have at one time or other been brought out, dealing partly or entirely with the hobby. The first and most successful of them was the *Picture Postcard and Collectors' Chronicle*, which started in 1900, and from its size, the number of advertisements in its pages and its general interest, gives some idea of the artistic and commercial importance to which picture post-cards have attained in Great Britain. So important, indeed, is the position which they have reached that many valuable concessions have been made by the Post Offices of most countries by way of extending the use of and cheapening the carriage of post-cards in general. Thus in 1903 leave was granted by the British Post Office for communications to be written on the front, or address side, of cards intended for home circulation—a privilege which was afterwards extended to all but one or two countries in the Postal Union; whilst in 1905 the postage on French post-cards was reduced from 10 centimes to 5 centimes, a similar reduction taking place in Italy in 1906.

Posters are large bills posted upon walls, hoardings and elsewhere for the purpose of advertisement. They consist either of simple printed announcements or of reproductions of designs in black and white or, more usually, in colour. These latter are known as artistic posters. Before the middle of the 19th century the artistic poster was practically unknown, such posters as had any vogue being simply ornamented with rough woodcuts. The introduction of lithography and its adoption as a commercial process gave more scope to artists, and in 1836 the first artistic poster appeared. It was designed by a French artist, Lalance, and advertised the publication of a book entitled *Comment meurent les femmes*. This poster incited the emulation of other artists—most of the leading artists of the day being influenced—and a number of posters by such men as Gavarni, Raffet, Johannot, and Manet was soon in evidence. So far the posters had been simple in character and were mostly printed in black or white on tinted paper, but in 1860 and afterwards attempts at printing posters in colour, and of a more elaborate nature, were made both in France and in England. These efforts culminated in 1866 in the appearance of a brilliant series of posters by the eminent French artist, Jules Chéret, who may be said to have been the first artist to appreciate fully the artistic possibilities of the poster. The brilliancy of his colouring, obtained by a simple arrangement of the primary colours, the daring nature of his contrasts, and the *verve* of his drawing at once attracted the notice of both public and artists. He may justly be called the founder of the artistic poster. A few years later witnessed the appearance of a number of artistic posters, diverse in character and designed by the most brilliant artists of the

day. The effective grotesques of Toulouse-Lautrec may be mentioned, as also the designs of Ibels and Bonnard and the veritable works of art of that superb draughtsman and brilliant artist Steinlen, whose poster of a girl in red, drinking from a bowl of Swiss milk, whilst three envious cats are clamouring for a share, became deservedly popular. Other French artists who have successfully produced artistic posters are Forain, Willette, Jossot, Mucha, Cazals, Guillaume, Valloton, and Ogé. Many fine artists whose realm is essentially that of oil-painting have made successful excursions into the department of poster-designing. Among these may be named Carrière and Aman-Jean. In England the artistic poster had appeared but occasionally and had been received with none of that *éclat* which had characterised its *début* in France. Among the first artists to try their hand at this class of work were Godfrey Durand and Walter Crane. Fred Walker's poster to advertise a dramatic version of *The Woman in White* in 1871 was the first to call serious attention to the practice of this branch of art in England. In 1881 the appearance of Hubert von Herkomer's striking poster for the *Magazine of Art* may be said to have set a vogue, and thereafter we find many posters of the better sort designed by many well-known artists, such as "Bubbles" by Sir J. E. Millais, and others by Stacy Marks, Sir E. J. Poynter and Sir James D. Linton. The year 1894 marked the beginning of a considerable development in the art of poster-production and the appearance of Aubrey Beardsley's characteristic poster for the Avenue Theatre, Dudley Hardy's clever designs for various plays and Maurice Greiffenhagen's effective poster for the *Pall Mall Budget* effectually established the artistic poster in England. Original posters in which simplicity was carried to its fullest extent were those produced by the Biggerstaff Brothers (James Pryde and William Nicholson). Other English artists who have designed posters are Brangwyn, Hassall, Cecil Aldin, Phil May, Raven-Hill, Wilson Steer, A. Morrow, Tom Browne, R. Sauber, and Fred Taylor, most of the designs being done for railway and steamship companies and theatres, and to advertise various food-stuffs. Artistic posters are also popular in most of the European countries, and although in a great many of them French influence may be traced, many artists of Germany, Italy, Spain, and Belgium have been responsible for much original work of undoubted excellence. In Germany the productions of Sattler, Otto Fischer, Max Klinger and Zambusch may be referred to. Italy is represented by the work of Mataloni, Hohenstein and Cappello. Spanish artists have distinguished themselves by many original and striking posters. Though most of them are anonymous, the work of Casas and of Utrillo, chiefly illustrative of fairs and bull-fights, should be mentioned. Rassenfossé, Birchmans, Meunier, Duyck, Cassiers and Toussaint have produced many fine posters in Belgium. Many Austrian artists such as Orlik, Schliessmann, Oliva and Hynais have designed posters of no little merit. In the United States the production of artistic posters has not been characterised by any remarkable designs, and with the exception of some by

Matt Morgan, no poster of much artistic interest was produced before 1889, when Louis Rhead produced a series of decorative posters. Although not conspicuously successful in the production of large posters, the Americans are almost unequalled in the designing of placards or small posters largely used to advertise magazines and books. In this connection may be noted the work of many well-known artists, such as that of Maxfield Parrish, Ethel Reed, F. Hazenplug, J. Gould, C. D. Gibson, Henry Mayer and Florence Lundbourg.

official and, although in certain exceptional cases private letters were forwarded by post, there was no need for a public office in London. At the end of the 16th century a foreign post, used mainly by the foreign merchants of London, was instituted and it was then that a Post Office in London first became necessary. It is believed to have been situated in Cloak Lane, near Dowgate Hill; but, although an organised system was first introduced at this date, it had very little relation to the service of the present day, which, in its turn,



HERKOMER'S POSTER FOR THE "MAGAZINE OF ART."

Exhibitions in many American and Continental cities have done much to popularise posters.

Post-mortem Examination. An examination of the body of a dead person is sometimes made, with the consent of the relatives or friends, with a view to establishing the diagnosis of the disease which has caused death, in instances where the symptoms during life have been obscure. Where there has been no medical attendance during life, or where there is any suspicion of foul play, the coroner may order a post-mortem to be made. The words *post mortem* are Latin and mean "after death."

Post Office. The establishment of "posts" dates from the reign of Henry VIII., but it was not until 1635 that the actual history of the Post Office can be said to have begun. Until that date the system of posts was hardly used for any other purpose than the conveyance of Government dispatches. The Master of the Posts was a Court

practically dates from the establishment of penny postage by Sir Rowland Hill in 1840. Previous to that date the Post Office existed almost solely for the purpose of the delivery and the collection of letters and, in the absence of anything like uniformity in charges, the varieties and complications were most bewildering. As late as 1808 the charges for inland letters were at the following rates:—A single letter going 15 miles, 4d.; 30 miles, 5d.; 50 miles, 6d.; 80 miles, 7d.; 120 miles, 8d.; 170 miles, 9d.; 230 miles, 10d.; 300 miles, 11d.; 400 miles, 1s.; and so on in proportion, one penny for each hundred miles. In 1695 the postage from London to Liverpool, or to York, or to Plymouth was, for a single letter, 3d., but in 1813 it was 11d. Various abuses and customs originated in these extortionate charges. The privilege of franking their own letters through the post (by writing their names on the outside of the letter or packet) and of giving franks to their friends was accorded to members of Parliament from about 1660 to 1840.

Till 1873 members of the United States-Congress and Government officials enjoyed a similar privilege. With the introduction, however, of a uniform rate of postage and the invention of the locomotive and telegraph, the work of the Post Office of the United Kingdom began to assume very large dimensions and the department was not long in adapting itself to the increased demands of the people. Now the collection and delivery of letters is not the only, and perhaps can scarcely be called the chief, work of the Post Office. The Money Order system was incorporated with the Post Office in 1838; the Savings Bank Department was started in 1861; Life Insurance and Annuity business was embarked upon in 1865; the telegraph wires of all the private companies were purchased in 1870; Postal Orders were first brought into operation in 1881; the Parcel Post was instituted in 1884. In virtue of the Telegraph Acts of 1892 and 1899 the telephone service was undertaken, in conjunction with the National Telephone Company, while the Wireless Telegraphy Act, 1904, placed this system under Government control for strategic purposes and authorised the Post Office to regulate the erection of stations and to grant licenses. In order to carry on this enormous business the Post Office employed, for the year ending March 31st, 1906, 195,432 persons of all classes. The gross revenue for the same period was £17,064,023, and the net revenue was £5,268,914. The number of post offices in the United Kingdom at the close of the same period was 23,283. Excepting one or two small islands, Imperial Penny Postage on outward letters prevails throughout the British Empire and to Egypt and the Soudan. For the year ending March 31st, 1906, 2,707,200,000 letters were delivered in the United Kingdom, the average number for each person being 62.5. To show the extraordinary rate of increase which has taken place in even so short a period, it is sufficient to state that the letters delivered for the year ending March 31st, 1886, amounted to 1,403,547,900, the average number for each person being 38.6. But the record for the year ending March 31st, 1906, is not complete without the following returns, showing that in addition to the letters there were also delivered 800,300,000 post-cards, 891,600,000 halfpenny packets, 185,400,000 newspapers and 101,700,000 parcels, making a grand total for the United Kingdom of 4,686,200,000 postal packets.

The Money Order business, together with the postal orders issued by the department, shows a similar increase. The number of postal orders issued in the United Kingdom for the year ending March 31st, 1906, was 97,271,000, representing an amount of £38,770,000. These figures sufficiently demonstrate the boon which the Postal Order system is to the people of the United Kingdom. The inland Money Orders issued during the same period were 10,758,785 for an amount of £36,872,608, the Foreign and Colonial Orders numbering 2,837,368, and representing £7,740,177. But perhaps the most remarkable branch of the department from the point of view of the public convenience is the Post Office Savings Bank, which, since its establishment in 1861, has increased by

leaps and bounds every year. The Postmaster-General's report attributes the great increase in the business which took place in 1892 to "the lamentable frauds and failures in connection with so many investment societies which have directed public attention more than ever to the unquestionable security of the Post Office Savings Bank." The amount (including interest) which remained to the credit of the depositors on December 31st, 1905, was £152,111,140, being £3,771,786 more than at the close of the previous year. The total number of depositors on December 31st, 1896, was 6,862,035. The number of depositors in the year 1905 was 9,963,049. The way in which this total is made up is rather interesting. For instance, in 1905, England and Wales contributed 9,027,112 to the number, or 1 in 3.8 to the total population, and £15 0s. 7d. was the average balance due to each depositor. Scotland contributed only 451,627, or 1 in 10.4 to the total population, and the average balance was £13 14s. 10d. In Scotland, however, the Post Office Savings Bank has to encounter rivalry with private enterprises which offer greater conveniences than similar institutions do in England and Wales. Ireland contributed 484,310 to the total, or 1 in 9.1 to the whole population, the average balance being £21 2s. 9d. Since depositors were enabled to invest in Government Stock through the medium of the Post Office Savings Bank, nearly £18,000,000 has been applied in this way. One of the special facilities which the Post Office offers to investors or depositors is the right to use the same deposit book at any Post Office Savings Bank. Of the aggregate number of deposits and withdrawals in one year nearly 32 per cent. were effected at offices other than those at which the accounts were opened, while, if the withdrawals are taken alone, the percentage is more than 43. On July 3rd, 1905, the system of "withdrawal on demand" was instituted under which a depositor, on presentation of his book at any post office open for Savings Bank business, can withdraw immediately any sum not exceeding £1. This privilege achieved instant success, the fears that it would open up a way to frequent fraud not having been realised. By an Act of Parliament passed in December, 1893, the annual limit of ordinary deposits was raised from £30 to £50. The annual limit for investments in Government Stock was raised from £100 to £200, and the total limit was raised from £300 to £500.

The Telegraph branch of the service, which since 1870 has become a monopoly of the Government, is still carried on at a loss, the deficiency for the year ending March 31st, 1906, taking into account interest and capital expenditure, being £1,033,190. The total number of telegrams of all kinds—ordinary, press, foreign, railway and Government—for the year ending March, 1906, was 89,478,000. By the Telegraph Act, 1892, a loan of a million sterling was authorised for the purchase of the trunk lines of the telephone companies and for the construction of a Government system to connect the business centres of the kingdom. The National Telephone Company conducts the greatest amount of business in the United Kingdom, but the trunk lines, which

extend to about 128,000 miles of wire, are the property of the Post Office, which will buy up the company's plant at its market value. In 1905-6 there were 1,755 circuits and 17,974,000 calls. The Parcel Post return for the year 1905-6 shows the total number of parcels conveyed to have been 101,682,000, as against 22,910,040 in the year 1884-85. It is significant that motor vans carry the parcel mails between London and several towns within a radius of 80 miles and also between important provincial centres like Leeds, Manchester and Birmingham and adjoining towns.

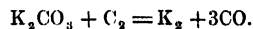
The Postal Union was established on the 1st of July, 1875, as a result of the Postal Congress held at Berne in 1874, and a treaty was signed by most of the European Powers and by the United States. A Postal Congress, to discuss points and to consider propositions affecting the Union, assembles once every five years, at which delegates from all the States concerned meet. The head of the British Post Office is the Postmaster-General for the time being. He represents the department in Parliament and his term of office is dependent on the life of the particular Ministry of which he is a member. The permanent heads of the Post Office are the secretary, the financial and assistant secretaries. Besides these officials, each department and branch has its own permanent chief, who is largely responsible for the work and discipline of his own office. The head office is at St. Martin's-le-Grand, where two immense buildings are quite insufficient to house the army of officials who are stationed at head-quarters. A third building has been added; but even with this in working order, the Savings Bank department had to find a home in Queen Victoria Street, and in 1903 it was removed to West Kensington. In October, 1905, the foundation stone of the New General Post Office was laid by Edward VII. The edifice occupies the site of the old Christ's Hospital, or Bluecoat School, in Newgate Street, and is called King Edward's Building.

Potash, or caustic potash, consists chemically of potassium hydroxide, KOH, and may be regarded as derived from water by the replacement of one-half of the hydrogen in the latter by potassium. It is formed when this element acts upon water and is usually prepared by boiling a solution of potassium carbonate with slaked lime, the solution being evaporated down in silver basins and cast in sticks. If required pure, it is recrystallised from hot alcohol. It is a very powerful alkali and absorbs carbonic acid and water very readily. It is a powerful caustic, acting strongly on organic matter. It is an invaluable reagent in the chemical laboratory and is employed in pharmacy and in very many chemical industries.

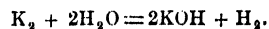
Potashes. This term is applied to the carbonate of potash which was formerly obtained by lixiviation of the ashes obtained from burnt vegetable matter. It is still obtained from this source in localities where wood is cheap. It is so formed owing to its occurrence in almost all vegetation, which derives the supply from the soil. On this account potash salts are a necessity in soils and, if

the natural supply is insufficient or becomes exhausted, it has to be increased by the addition of potash manures. Other sources of potassium carbonate have now almost entirely supplanted the former potashes, or pearl ash, as the crude product was then called, the greater portion being obtained by chemical means from the potash salts which occur so plentifully in the salt beds of Stassfurt, a town in Saxony, and the crown-land of Galicia in Austria-Hungary. It is extensively employed in glass-making, soap manufacture, in the chemical laboratory and a number of chemical industries.

Potassium (K=39). Although the compounds of this metallic element are widely distributed and plentiful, it was not itself prepared until the year 1807, when Sir Humphry Davy obtained it by the decomposition of the fused potassium hydrate (potash) by means of an electric current. It occurs in nature largely as silicates in various rocks and minerals, as felspar, mica, etc. It is a constituent of all plants, combined with organic acids, and remains in the ash when the plants are burnt. [POTASHES.] In sea-water it occurs to a considerable extent and vast beds of potassium salts are found at Stassfurt. Deposits of nitrate of potash, or nitre, are met with also as an efflorescence on the soil in certain tropical localities—e.g., Chile, etc. The metal is prepared by heating strongly a mixture of the carbonate and carbon; it is then produced in accordance with the equation



The ignition is effected in iron cylinders, the potassium which distils over being condensed in flattened iron receivers, but the manufacture is attended with considerable danger. The element is a white metal with a violet tinge and very soft. It possesses a specific gravity of about .86. Hence it floats on water, which it decomposes with the liberation of hydrogen, which the temperature is high enough to ignite. Owing to this, it immediately tarnishes in moist air and has to be kept under naphtha or liquid hydrocarbon. By this action of water potash is formed—



It melts at 62° F. and yields a green vapour at higher temperatures. It appears to form three oxides of the composition K_2O , K_2O_2 , and KO_2 . Many of the salts of potassium are substances of great importance. The hydrate, KOH, is known as potash and the carbonate first came into commerce as potashes. The chloride, KCl, is an important salt—white, crystalline and readily soluble in water—which is chiefly obtained from the Stassfurt beds. The chlorate, $KClO_3$, is very largely used in pyrotechny, forming with sulphur or charcoal a very explosive mixture. It is therefore dangerous to use, except by those fully conversant with its properties. In medicine and pure chemistry chlorate of potash also finds use, while it is largely employed in the manufacture of lucifer-matches. Potassium bromide and iodide are both valuable medicines, the former in nervous affections and the latter in

skin diseases and many other cases. The sulphate, K_2SO_4 , has been long known and is employed in the preparation of alums and medicinally as a purgative. The chromate and bichromate, K_2CrO_4 and $K_2Cr_2O_7$, are respectively yellow and red salts used extensively in the laboratory, in dyeing, calico-printing, in the manufacture of pigments and in certain processes in photography. The cyanide, KCN, is a white, highly-poisonous salt used very largely in photography, electroplating and in chemical operations. A mixture of various sulphides is used in pharmacy under the name of liver of sulphur. Probably the most important of its compounds, however, is the nitrate, KNO_3 , which finds innumerable applications under the names of nitre and saltpetre. [NITRE.]

Potato, a corruption of the name *Batatas*, referring originally to the Spanish or Sweet Potato (*Batatas edulis*), a member of the Convolvulus family, but now far more generally used for *Solanum tuberosum*, the most valuable species of the Nightshade family. It occurs wild in various parts of South America and is believed to have been brought to Europe by the Spaniards early in the 16th century, though Sir Walter Raleigh's colonists only brought it from Virginia to Ireland in 1686 and it did not reach Scotland till 1725. Its coarse leaves are lyrate and interruptedly pinnate and it has a large handsome flower, either pale lavender or white, which is succeeded by a nuculane. The tubers vary in size, shape and colour; but exhibit their stem character in the buds or "eyes" they bear. The plant is commonly propagated by cuttings of these tubers. About 75 per cent. of the potato is water and the rest very largely starch, so that it is by no means a highly nutritive food. In cultivation the plant has become very subject to the attacks of the parasitic mould *Phytophthora infestans*, now generally known as "the potato-disease," which discolours the leaves and spreads down into the tubers. In the hope of obviating this, other species have been experimentally introduced from the moister regions of the Andes, notably *S. Maglia*, or Darwin's Potato. Notwithstanding its poor qualities as an article of diet the potato is the staple food of the Irish and other peoples in the northern hemisphere. It was the failure of the crops in Ireland from various causes that precipitated the repeal of the Corn Laws in 1846. With the addition of fatty foods, such as bacon, the nutritive value of the potato is considerably enhanced. In addition to their use as a vegetable, potatoes yield much starch for other purposes. It is mixed with flour in bread-making; from it "British arrowroot" and other food substances are prepared; and large quantities are converted into dextrin or British gum, which is used for postage-stamps, envelopes, etc. Much of the "silent spirit" or unflavoured alcohol manufactured on the Continent is prepared from potatoes.

Potato Beetle, or COLORADO BEETLE (*Doryphora decemlineata*), an insect belonging to the family Chrysomelidæ of the tetramerous section (or section whose tarsi or feet are four-jointed) of the order Coleoptera. It is about half an inch long,

oval in shape and nearly convex, of the colour of yellow ochre and marked with black spots, the wing-cases bearing black longitudinal stripes, five on each cover (hence the descriptive scientific name). It was discovered by Thomas Say (1787-1834) on his expedition to the sources of the Minnesota or St. Peter's River in 1823, but it was not till 1859 that it was found to be a perfect pest of the potato, on which the larvæ and adults feed. From its home in Colorado it gradually spread over the United States and into Canada. In 1877 it arrived at Liverpool, but the most stringent precautions had already been taken by the authorities and, as an undesirable alien, it is unlawful to sell, keep, or distribute it even should it effect a footing on British soil. Other members of the family of brassy-green metallic lustre are tolerably familiar and, though some of them are harmful to grasses and cereals, they do not work havoc on a great scale.

Potemkin, GREGORY ALEXANDROVICH, one of the chief favourites of Catherine II., was born at Domnovo, Smolensk, Russia, in 1739. He would appear to have had some intention of entering the Church, but ultimately became a soldier. In 1762 (the year in which her husband, Tsar Peter III., was murdered) he attracted the attention of the Tsarina, after which his rise in favour and station was rapid. For thirteen years he directed the foreign policy of Russia, obtained the annexation of the Crimea in 1783 and was commander-in-chief in the Turkish War which began in 1788, though its successes were probably chiefly due to the ability of Suvarof, who served under him. Whilst travelling, in broken health, to Otchakov he was unable to continue the journey and died on October 15th, 1791.

Potential is a mathematical function first used by Laplace in his investigations on gravitation. George Green (1793-1841), however, who gave it the name, was the first to work out a theory of potential, his theorems embodying the fundamental properties of the function and remaining undiminished in importance at the present day. The function is of special value in the consideration of conservative systems. A conservative system consists of any definite number of bodies whose mutual forces do the same amount of work in changing from one position to another, whatever be the route followed. Thus (disregarding friction, which cannot belong to a conservative system), the same amount of work will be required to lift a body vertically ten feet as to carry it up a flight of steps to the same level. The earth and the body are, in fact, a simple example of a conservative system. It is a property of matter that every particle of it attracts every other particle with a force whose direction is that of the line joining the two particles, and whose magnitude is proportional to the product of the masses of the particles divided by the square of the distance between them. This property also belongs to magnetism and electricity. In these cases the force between the given bodies depends only on the distance and the question of their velocities

is not considered. This determines that the system shall be a conservative one and therefore that the theory of potential applies to it. The potential energy of a conservative system in any particular configuration is the amount of work which must be done upon it to bring it from some standard configuration to the one in question. If we are dealing with two bodies between which any attractive or repulsive force is acting, the standard position is taken to be that in which they are infinitely far apart. In the case of gravitation work would be done *by* the bodies in being brought near to each other from their far-off positions, hence the amount of work done *upon* them would be negative—*i.e.*, their mutual potential energy would be negative. When electrical or magnetic repulsion is the active force, the mutual potential energy will be positive; thus two north poles of a magnet will have a positive mutual potential energy. The potential *at* any point is considered to be the mutual potential energy between a unit mass placed at the point and the body causing such potential. Thus the potential at a point four feet away from a mass of 2 lbs. is the mutual potential of two masses of 2 lbs. and 1 lb. respectively four feet apart, and is the amount of work which must be done to bring the 1 lb. from infinity to the point in question. It is convenient in this case to change the sign, and so to regard the potential as positive. Let V_A be the potential at A due to any body some distance off and let V_B be the potential at B due to the same body. $V_A - V_B$ is then the difference of potential between A and B and is the work which must be done to take a unit mass from A to B, whether the mass be moved along A B or any other path A C B. If the attracting body be far from A and B, we can consider the forces between the body and unit mass at A and at B to be parallel. This force can be resolved into a component, P, along A B and a component, Q, perpendicular to it. To move unit mass from A to B requires an amount of work, $P \times A B$. But we saw that $V_A - V_B$ was also equal to this amount of work. Therefore—

$$P \times A B = V_A - V_B, \text{ or } P = \frac{V_A - V_B}{A B}.$$

Hence in this case the force in the direction A B is equal to the rate of change of potential per unit length and, as the attracting body is very far off, A B may be *any* direction. The theory of potential is embellished with elaborate mathematical expressions which find their chief application in electrical and magnetic investigations. Nature, however, never gives us an example of a perfect conservative system. Invariably we find that friction, resistance of the air, resistance due to electric induction, or some other form of resistance, steps in to destroy the simplicity of what might appear to be a conservative system and causes in it an inevitable loss of energy.

Potentilla, a considerable genus of herbs and shrubs, including about a dozen British species and belonging to the order Rosaceæ. They are found in both the Old and New Worlds north of the equator, only two species being known to the south.

Their leaves may be ternate, quinate, or pinnate, and are sometimes silvery on one or both surfaces. The five-leaved calyx has an epicalyx immediately below it and the petals are generally five and yellow, but may be four and white, orange or crimson. The quinate forms are called "cinque-foils." They are closely related to the strawberries—some species producing "runners"—but the fruit is a dry heterio of achenes.

Potomac, a river of the United States, rising from two sources in the Alleghany Mountains in West Virginia. Uniting on the border of Maryland, about 15 miles south-east of Cumberland, the combined stream separates Maryland from West Virginia and Virginia, and is reinforced by several affluents from those states and from Pennsylvania, the largest of these being the Shenandoah, which joins it on the right at Harper's Ferry. An estuary opening into Chesapeake Bay forms the mouth of the river, the entire length of which is about 450 miles. Washington stands on its banks, about 125 miles from the sea, and to that point vessels can ascend.

Potosi. [SAN LUIS DE POTOSI.]

Potosi, the chief town of the department of Potosi, Bolivia, is situated on a bleak plateau, 13,250 feet above sea-level, under the peak of Cerro de Potosi, and near the sources of the Pilcomayo. It thus enjoys the unique distinction of standing at a higher elevation than any other town in the world. Silver was first discovered here in 1545, and the town was founded two years afterwards. It is estimated that upwards of three hundred million pounds' worth of the precious metal have been obtained since it was discovered. The principal buildings are Government House, the Town Hall, cathedral, mint and college. A monument to Bolivar, the Liberator, was erected in 1825. In the heyday of its prosperity in the first half of the 17th century the inhabitants are said to have numbered 160,000. The city now wears a deserted and cheerless aspect. Pop. (1900), 20,910. The department of Potosi has an area of 48,790 square miles, is almost wholly mountainous and contains mines of silver, gold and tin, the first named being the richest in South America. Pop. (estimated), 392,738.

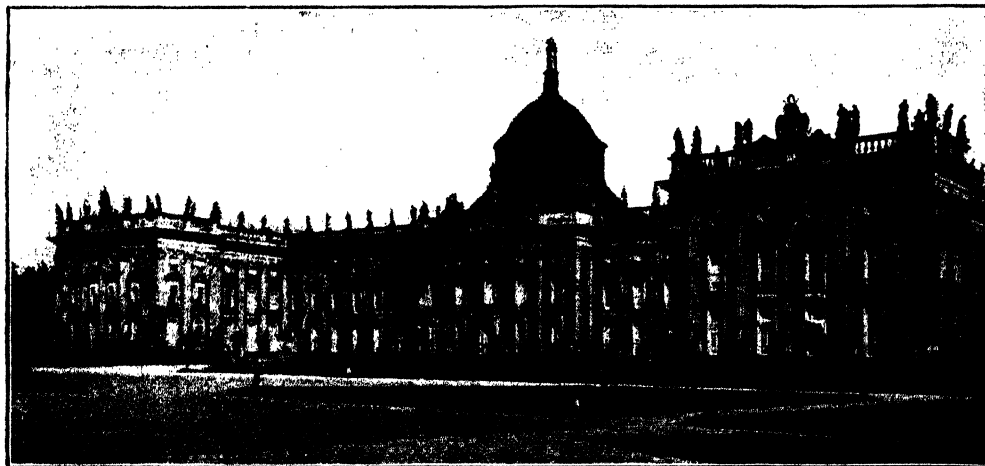
Pot-pourri, a mixture of the dried petals of rose-leaves and other flowers of delightful perfume, usually stored up in a jar of artistic design and manufacture, for the purpose of scenting a room with the fragrance. Spices and other sweet-smelling articles were sometimes added to the collection. The word has also been applied to a dish of scraps of meat and vegetables cooked together, a kind of hotch-potch; to so-called musical compositions known as medleys and to literary efforts of a disjointed sort, without any bond of union or principle connecting them and somewhat resembling samples from a scrap-book.

Potsdam, the chief town of the province of Brandenburg, Prussia, 16 miles S.W. of Berlin on

the river Havel, here broken into many small lakes. It is the suburban residence of the Imperial Court. The surrounding scenery is pretty and the various parks are laid out with much taste, almost justifying the popular epithet of "the German Versailles" given to the town and its environs. The Royal Palace, the park of Sans Souci, with the palace of the same name (erected in 1763-9 by Frederick the Great), the New Palace, the Charlottenhof (a building in the style of a Pompeian villa), the Orangery, and the great drill ground with barracks and military school, and the Marble Palace (the residence of Wilhelm II. before he became Kaiser),

uncertain. He was educated at Wakefield Grammar School and University College, Oxford. He entered the Church and acquired some reputation for his classical learning, his *Archæologia Græca*, a work on Greek antiquities, being for some time very popular. In 1708 he became Regius Professor of Divinity at Oxford and seven years later Bishop of Oxford. Here he remained till 1737, when he succeeded Wake in the Archbishopric of Canterbury. He died at Lambeth on October 10th, 1747.

Potter, PAUL, animal-painter, was born at Enkhuizen, in Holland, in 1625. He was taught by



POTSDAM: THE NEW PALACE.

the Babelsberg Palace, the Geodetic Institute and other buildings devoted to scientific pursuits are the chief places of interest. In the mausoleum attached to the Friedenskirche (which was built by Frederick William IV. as the "Christian counterpart to the worldly negative of Sans Souci") lie the Emperor Frederick and his Empress, the Princess Royal of Great Britain. Pop. (1900), 59,814.

Pottawatomies, North American Indians, a branch of the Algonquian family, whose hunting-grounds formerly extended round the southern shores of Lake Michigan chiefly in the present states of Illinois and Wisconsin. At a great gathering of the nation in 1833 at Fort Dearborn, where now stands Chicago, about 20,000,000 acres of their domain were ceded to the United States, and since then all, except a small band in Wisconsin, have been confined to various reservations, such as the Sac and Fox Agency, Oklahoma, Pottawatomie Agency, Kansas and Walpole Island, Ontario. Their numbers do not exceed 3,000 all told.

Potter, JOHN, Archbishop of Canterbury, was the son of a draper in Wakefield, Yorkshire, where he was born in 1674, though the date is a little

his father, Peter Potter, a landscape and figure artist of some repute. About 1650 he settled at The Hague, the gallery of which now contains his masterpiece "Young Bull," painted for Maurice, Prince of Orange. In 1652 he removed to Amsterdam, where he died at the age of twenty-nine, in 1654. His paintings were mostly on a small scale, firmly drawn in transparent colour, the scenery being introduced with great skill and relevance. He also produced some etchings of animals that show similar power of handling.

Potteries, The, the district in the north of Staffordshire, England, constituting the headquarters of the manufacture of china and earthenware. The principal towns included under the title are Stoke-on-Trent, Hanley, Longton, Newcastle-under-Lyme, Fenton, Tunstall and Burslem. Within the area thousands of persons are employed in all the branches of the potter's art, from the commonest ware to the costliest and most artistic vases and other articles of vertu. Sanitary ware and druggists' stoneware utensils are also comprised in the industry. Though the manufacture is concentrated in this region, there are famous works elsewhere, as at Lambeth, Derby and Worcester.

The raw material for many of the processes has to be imported, chiefly from Devonshire, Cornwall and Dorset.

Pottery. The word "pottery" is derived through the French *poterie* from the Latin *poterium*, a cup or drinking vessel. This, originally of clay of the simplest form, came to stand for all kinds of vessels made of earthenware. The potter's art is perhaps the oldest in the world. The wonderful series of monuments in Egypt allow of a more or less accurate history of many arts to be written; and from this source it is certain that from 3000 B.C. jars for milk and wine, and pans and bowls for domestic use, were in common use in that country. As to how long before this date and how far back into prehistoric times, pottery was made, it is impossible, in the present state of our knowledge, to make any useful guess. The earliest potter's vessel was made of clay, roughly moulded or modelled into its shape, whether globular or elongated by the hand of the worker, which, guided by his eye, served to make some very symmetrical vases such as are now found in the tumuli of the early inhabitants of England. At first these were simply sun-dried or air-dried and were naturally very friable and useless for service as containers of anything but corn, seeds, or similar substances. It was, however, very early in the history of our civilisation that man found that fire had the effect of hardening the crumbling clay and from that time the potter's work was fired and his art became

hold, coatings of wax or pitch being applied to their internal surfaces to render them more or less watertight. This was done to those vessels of the Greeks and Romans that were destined to contain water or wine or oil, and, indeed, the method is used to this day in many Mediterranean countries. Certain finer wares were, however, exceptions to this rule. They were more or less impervious owing to the fineness and closeness of the texture of which they were made, rather than in consequence of the application of a glaze such as we are accustomed to see. Nevertheless, true glass glazes and true enamels were known in Egypt and Assyria in very early times and, doubtless, the necessity for rendering the ordinary baked vessel capable of holding liquids led to the early application of either glaze or enamel to the ware to bring about this end. The early Greek and Etruscan pottery exhibits not only a rudimentary glaze, but, what is more interesting, shows that by the application of outlines and painting to their vases—by which they have transmitted to us a storehouse of facts, traditions, myths and folklore—they have produced vessels that are now valued as the highest efforts of the potter's art. The invention of the potter's wheel or lathe, laid horizontally and revolving on a central axis and pivot, on which the clay was "thrown" and to which it adhered sufficiently firmly to allow it to be accurately shaped, was a wonderful advance; for, as the wheel spun round, all possible combinations of spherical and cylindrical forms, of even thickness and of perfect symmetry,

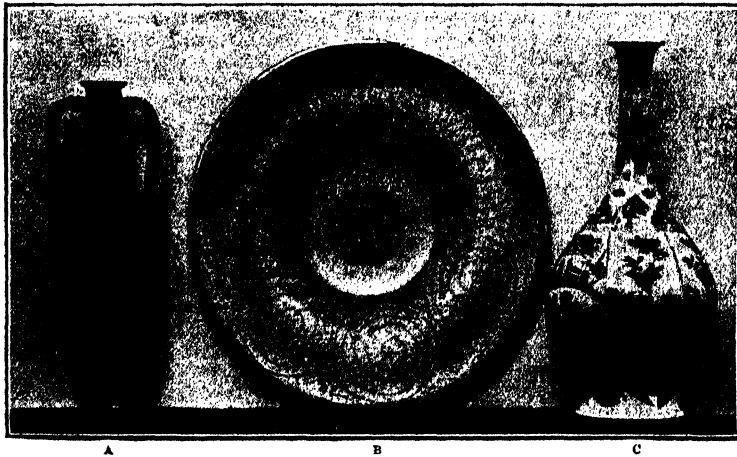


Fig. 1.—A, Vase from Cyprus, illustrating unglazed ware; B, Damascus plate, silicious glaze on a white ground; C, Chinese bottle, porcelain, felspar glaze.

a permanent record of civilisation. For many centuries in every country these simply-baked pots were all that was known and various expedients were used to prevent the loss, by reason of their porosity, of the liquid which they were required to

could be produced with great speed. It is remarkable that no instance of Greek work has been found that has not been "thrown" on the wheel or moulded, though this latter method of production is only found in the latest wares. Pottery may be

divided into certain large sections, such as glazed and unglazed. The unglazed ware (Fig. 1, A) may be of hard or soft body. A soft body is one that can be scratched with a knife. The glazed wares, again, can be divided into those which are glazed with glass glaze, with lead glaze, or with

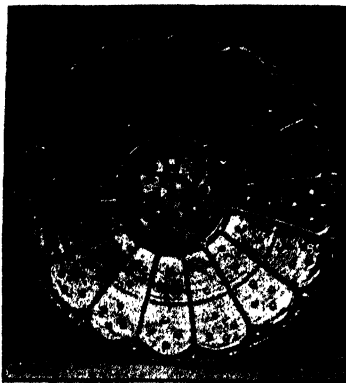


Fig. 2.—HISPANO-MOORISH PLATE, LUSTRE ON THE ENAMEL.

salt glaze. A further subdivision may be made of those wares which are coated with enamel.

The ordinary potter's vessel is made of any suitable clay and, after being fired in a kiln to render it capable of being handled and to make it hard and compact, it is dipped into a mixture of powdered glass and water (the constituents of which are silicious sand and soda) and fired again to fuse this opaque-looking powder into a clear transparent skin or glaze. It is obvious that the original colour of the baked clay is seen through this glassy coating. The addition of lead to this powdered glaze and water gave a material that was more easily fused and not less transparent, but from this cause it still allowed the colour of the body of the pot to show through its clear substance. The opportunity to use colour was slight and efforts were made to find a surface suitable to take simple colours. A very obvious means to obtain this was to coat the common body with a layer of white clay, such as pipe-clay, and, after firing, paint on this as on plaster or paper and then glaze on it over the coloured pattern upon its surface. After firing, this pattern became embedded in the glaze of the surface of the pot. Still working in the same direction, it was found that the addition of the oxide of tin gave to the glaze a perfectly smooth, flowing, glossy, but opaque white surface, which covered all the roughnesses and inequalities of the body, whether of colour or texture. It was further found that various metallic colours could be applied to this surface before firing, which became embedded into it after the whole had been fused in the kiln. This method of treating ware prevailed from the 15th century without interruption until the introduction of porcelain from China drove it out of use, the newer material having a

far finer surface on a far harder and whiter body. Another method of glazing ware, which was also without doubt discovered many centuries before pottery was wanted for anything but the most strictly utilitarian uses, was that of salt-glazing. The material to which this method is applied must be of extremely hard body, as it is necessary that it shall be at a white heat before the salt is applied. This substance is thrown into the kiln on to and among the pieces of ware and is decomposed by the intense heat. Its soda is volatilised and seizes on the surface of the ware (in which a certain amount of flinty clay is present), and combines with the ware itself in the form of pure flint-soda glass, absolutely adherent as a portion of the pot is dissolved to make it. Of this ware one of the most recent developments is that known as Doulton ware and before modern times a very artistic ware made on the Rhine was known as Grès de Flandres, or Steingut of the Germans. It is called stoneware by all English writers (Fig. 3).

As regards the other methods, that described as tin enamel is characteristic of the wares of Italy, Spain, and Sicily since the beginning of the 15th century and is perhaps the most artistic pottery ever produced. It had in Italy the services of designers of the first rank and is sometimes called Raphael ware from a doubtful tradition that that great painter designed for the master-potters of this ware. It is also the covering of the beautiful Hispano-Moorish wares (Fig. 2) of the later time of the Moorish artists, who were probably the introducers of this manufacture into Sicily and Italy. Both Spanish and Italian "majolica," as it is called, was decorated as to its surface with "lustre," an effect produced by the reduction by heat of a film of metal from certain metallic salts which, in their reduced state, reflect light with ruby, green, purple, and other tints. The knowledge of this property of metal, however, preceded the introduction of the enamel ware. The common pottery of many Continental countries is to this day covered with this tin enamel, and it formed the basis of the ware known as Delft, which was produced in Holland in enormous quantities and exported for use in England very largely in the 17th and 18th centuries. Dutch potters introduced this manufacture into Lambeth, where it continued to be made until within living memory. It was superseded by the cheaper and better earthenware of Staffordshire.

The method of laying a coating of white pipe-clay

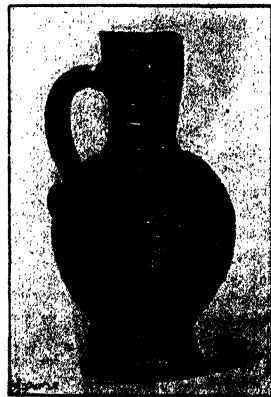


Fig. 3.—RHENISH JUG, STONEWARE, SALT GLAZE.

on to a common body was the ordinary one of decorating tiles and other pottery ware all through the Middle Ages in England and other European countries. It was an obvious thing to scratch away and remove parts of this coating to show in contrast to it the ordinary body of the ware; but the great artistic ware made by this method is the Persian or Rhodian ware (Fig. 1, B). The same method also exists to this day in India and other parts of the East, especially in Sindh, and has been the one used in many modern revivals of artistic ware in England, France and India. The lead-glazed wares have been for many centuries the most commonly used of all the various methods of production, and still are the most widely produced of any. These wares were probably the only ones known in Europe until the discovery of tin enamel in the 15th century. Specimens of lead-glazed ware have been found in Assyria and Egypt, though it is probable that in these cases the lead was used as a flux for certain colours. Ancient examples are found in Southern Italy, in Pompeii and other places and exist to this day in the common as well as in the better wares of Staffordshire. A simple example of this method is an ordinary bread-pan. Henri Deux ware of the 16th century is probably the highest example and this ware has commanded a higher price than any other. Of unglazed pottery there is an absolutely unbroken tradition of manufacture from prehistoric times to the flower-pot made to-day. It has subserved the humblest uses and has also embodied the loftiest ideals of beauty the human mind has reached in the best types of Greek pottery.

Porcelain (Fig. 1, c) is a Chinese invention of very great antiquity, is characterised by an intensely semi-vitreous body, is glazed by a very hard preparation and is unlike any of the above-mentioned wares. After its general introduction by the Dutch in the 17th century, it was extensively imitated in Europe and by its beautiful surface and glaze and imperviousness drove out the more artistic tin enamel and Delft wares from household use. The effort to imitate cheaply this beautiful porcelain body led to the invention of our ordinary every-day table ware, which by its cleanliness has superseded the wooden platter and the pewter or Delft plate of the 18th century and is one of the most ordinary requirements of our daily life.

Potwallopers, one who boils his own pot or prepares his own food. It was used with special reference to voters in some English boroughs before the Reform Act of 1832. Every male inhabitant, whether housekeeper or lodger, was entitled to a vote, provided he had resided for six months in the borough and had not been chargeable to any township as a pauper for twelve months. How the term specifically arose will be best understood from the following extract from the *Tour through Great Britain* (1724-6), by Daniel Defoe, who, however, spells the word "pot-walloner":—"The election of members here [Taunton in Somerset] is by those whom they call *pot-walloners*—that is to say, every inhabitant, whether housekeeper or lodger,

who dresses his own victuals; to make out which, several inmates or lodgers will, some little time before the election, bring out their pots, and make fires in the street, and boil victuals in the sight of their neighbours, that their votes may not be called in question." This cooking that they might be seen of men interestingly proves that the votes had then a money value which was worth safeguarding, although we may also rejoice that the "good old days" of such "free and enlightened" electors have gone for ever.

Pouched Rats (*Geomys*), a family of Rodents distinguished by the presence of great cheek-pouches, one on each side, opening outside of and not inside the mouth. The pouches are hairy inside throughout. The family is divided into two sub-families, the *Geomys* or Pouched Rats, and the *Heteromys* or Pocket Mice. The Pouched Rats are more or less rat-like; the feet are five-toed; the toes are furnished with claws, those of the fore feet being strongly developed, and the tail is short. They are found in North America from Hudson Bay and the Columbia in the north to Mexico in the south. The Common Pocket Gopher inhabits the Mississippi Valley and extends into Canada. It is stout and clumsy, but has a coat that rivals the mole's for its beautifully soft and velvety texture. It lives in burrows and throws up mounds just like mole-hills. The outer ears are wanting and the eyes are very small, to suit its subterranean habits. It feeds on roots of plants and trees. The cheek-pouches are used for the purpose of carrying food to the store-chambers. The creature fills the pouches with the help of its tongue and empties them with its fore paws. The *Heteromys* are of more slender and more delicate form, with the hind legs and tail elongated as in the Jerboas. The eyes and ears are large and the animal is adapted to an open-air life. They are almost entirely confined to Central America and the southern United States, though a few species occur as far north as Hudson Bay and one is found in Trinidad. Phillips's Pocket Mouse (*Dipodomys Philippii*), the best-known species, is a pretty little creature that hops about of an evening as gaily as a Kangaroo. The places it frequents are so bare and destitute of water, the wonder is it survives. It picks up somehow seeds, grasses and roots, which it conveys in the big cheek-pouches to its burrows.

Poughkeepsie, the capital of Dutchess county, New York, United States, on the left bank of the Hudson, 74 miles N. of New York. Founded by the Dutch at the beginning of the 18th century, it received its city charter in 1854. The principal buildings comprise Vassar College (for women), founded in 1861 by Matthew Vassar (1792-1868), the observatory of which has a high reputation, the Vassar Brothers Institute (founded by Matthew Vassar *secundus* and John Guy Vassar, nephews of Matthew Vassar), Pringle Memorial Home and several excellent educational institutions lodged in fine structures, the public library, Hudson River State Hospital for the Insane, and other charitable establishments. The manufactures include machinery, agricultural implements, furniture, glass,

clothing, cigars, shoes, hardware, carriages and silk thread in addition to iron-founding. Pop. (1900), 24,029.

Poultice, or CATAPLASM, an external application usually made of linseed meal or bread and boiling water, and applied as hot as can be borne to painful or inflamed parts. The chief virtue of a poultice consists in its being a convenient form of applying heat. Sometimes a little mustard or other stimulating substance is used in making a poultice, with a view to producing counter-irritation. Applied to superficial inflammation poultices hasten its course, either by relieving it or causing matter to come more rapidly to a head. In internal inflammation they are useful by drawing the blood from the affected part to the surface. They are exceptionally valuable in the case of wounds that are either unhealthy or discharging foully. A few poultices will cleanse the part, remove the discharge and prepare the way for still more efficacious applications (such as lint soaked in boracic acid lotion).

Poultry, a general term including domestic fowls, ducks, geese, turkeys, etc., kept by man, and reared for the table, for the sake of their eggs, etc., or for ornamental purposes. Most, if not all, of the domestic breeds of fowls are descended from the Jungle Fowl of India (*Gallus bankiva*), a form not much unlike the modern Game-Bird. Domestication took place at an early period; references to the domestic fowl occur in the writings of Aristotle and, according to some, the bird was introduced into Britain by the Romans, but Julius Caesar says that he found the hen and the goose in a state of domestication, though the Britons did not eat them (*De Bello Gallico*, v. 12). The best breeds of fowls for the table are the Dorkings, Game-Birds, and the French Fowls. The first-named are probably the best of all; the meat is not only abundant and of good quality, but is produced in greatest quantity in the choicest parts—the breast and wings; and no breed is so easily got into good condition for the market. Among the best breeds for laying are the Hamburghs, Houdans and the Mediterranean breeds (Anconas, Leghorns, Minorcas and Spanish). For general purposes, that is, for table-fowls and layers, the Chinese or Americans are probably the best. There are many “fancy” breeds of the domestic fowl which have no economic value, but are bred either for show purposes or for the beauty or strangeness of their plumage. Of Ducks, the best-known varieties are the Aylesbury (with white plumage), the Rouen, Peking and Cayuga. There are other varieties and distinct species, which are kept as ornamental water-fowl. Though consumed largely in Germany, geese, according to Lewis Wright, the standard authority on Poultry and Poultry-farming, are declining in relative popularity in Great Britain. Of late years the question of poultry-farming has excited a large amount of attention in Great Britain and the United States. Its importance will be at once apparent when it is said that the United Kingdom annually pays about £6,000,000 sterling to

Continental nations for eggs and poultry, which, under proper conditions, might be produced at home by the British and Irish farmer and cottager. Poultry-farming, pursued on more systematic lines than was once the case in Great Britain, is becoming a profitable occupation, though it is to the United States that we must look for its fullest development. Decided progress has accrued from the adoption of artificial means of incubating and rearing the chicks, the British farmer adopting the “tank,” the American the hot-air, system of incubator. On the Continent and in Ireland the breeding of fowls for the table and the production of eggs for the market are not always separate industries, but supplemental sources of income to farmers and dwellers in the country parts. The fattening in France, however, is a special business, the birds being bought from those who rear them, and penned and fed by hand or with a machine that forces fattening food, chiefly buckwheat, into the crop. Poultry-raising and the production of eggs might be more advantageously carried on in Great Britain by farmers and by those who have land attached to their houses, for in such cases the birds can pick up a good deal of food for themselves and their manure is an important item. The speedy preparation of birds for the market and the methodical collection of eggs are of obvious importance if profit is to be made, and the manner in which the commodities are sent to market has a great effect on their ready sale. Good breeds of table-fowls should be chosen, and the eggs sent off, if possible, every other day (if it is impossible to do so every day), for prime poultry will always fetch its price and a new-laid egg is worth much more than one a week old.

Pound, a piece of land or a building where goods which have been seized as distress are placed by the distrainer; as soon as this has been done the goods are in the custody of the law. It is either pound overt, that is, open overhead (used for cattle), or pound covert; goods liable to be damaged by the weather or stolen must always be impounded in a pound covert.

Pound (symbol lb., from the Latin *libra*), the unit of mass or weight in the British Empire. The word has its equivalent in several other European countries, although it does not always express the same mass. It is said that its weight in England was derived from that of 7,680 well-dried and perfect grains of wheat, but this would obviously be liable to error. The British standard unit of mass is the Imperial standard pound avoirdupois—a mass of platinum kept at the Exchequer Chambers; this contains 7,000 grains, while the pound troy contains only 5,760. It may be added that 2·2 lbs. are nearly equivalent to 1 kilogramme in the metric system. The word pound has another use: a pound of silver was used as a standard of money by the Romans, and hence was adopted in England. It is commonly distinguished from the pound weight by the epithet “sterling.” This amount of silver was at one time made into twenty shillings, but, with characteristic artfulness, Edward II. made twenty-five from it, and later

monarchs reduced the shilling till, at one time, nearly three hundred were coined from a single pound. The number now made is sixty-six; but the word pound is altered in meaning and is now applied to a sum of twenty shillings. The gold sovereign has replaced the silver pound as a standard of value, the twenty shillings being merely tokens. The pound Scots was equal to one-twelfth of the pound sterling and was divided into twenty shillings, each worth only an English penny.

Poundal, the name proposed by Professor James Thomson for the British kinetic unit of force. It is that force which, acting on a mass of one pound for one second, produces in it a velocity of one foot per second. It is therefore equal to $\frac{1}{g}$ the weight of a pound; that is, about one thirty-second.

Pounds, JOHN, the originator of Ragged Schools, was born in Portsmouth, England, on June 17th, 1766. His father, a sawyer in the Royal Dockyard, apprenticed him to a shipwright, but an accident crippled him for life. He then turned to shoe-making and started on his own account in 1808. Ten years later he took charge of the young son of a sailor brother and, recognising the child's need of boy companions, introduced one by one several lads to the simple class he had formed at home for the teaching of his nephew. Interest in this work grew upon him until he found himself teaching as many as forty children (girls as well as boys) at a time. Besides the three R's, he taught them how to cook, cobble, sew and darn, and took them on country excursions. He also ministered to the wants of his poor neighbours in hard times and severe weather. After his death in Portsmouth on January 1st, 1839, the merits of his modest work became publicly known and ultimately issued in the setting up of the system of Ragged School education. In 1847 Dr. Thomas Guthrie published his *Plea for Ragged Schools*, in which he recorded the fact that John Pounds originated the idea.

Poussin, GASPARD, painter, was born in Rome in 1613. His real name was GASPARD DUGHET and he was the brother-in-law of Nicolas Poussin, who adopted him as his son, gave him his name and made him for a time his pupil. He became favourably known for his rendering of landscapes in which the elements of tempest or of wild and rugged grandeur predominated. He executed a "Landscape" in fresco, a "Hurricane," "The Deluge" and other subjects for the Pitti Palace in Florence. There are several examples of his work in the Louvre, the Prado in Madrid, and Vienna, but there is nothing finer than his "Sacrifice of Abraham" in the National Gallery, London. He died in Florence in 1675.

Poussin, NICOLAS, painter, was born at Villers, near Les Andelys, in the department of Eure, France, in 1594. He showed a bent towards art in his youth and studied—in circumstances of great difficulty—at Paris and Rome. By 1630 he had won a reputation and his trials were over and, ten

years later, he went to Paris, where Louis XIII. made him first painter-in-ordinary to the King. He soon tired of Court ways and intrigue and betook himself again to Rome, where he died on November 19th, 1665. His best pieces, "The Last Supper," "The Triumph of Truth," "Diogenes Throwing away his Scoop" and "The Labours of Hercules" series, are in the Louvre, but there are worthy examples of his genius in the National Gallery, London, and the Dulwich Gallery. He had a noble sense of composition and painted in the grand manner grandly.

Povindah (Persian *Parwinda*, "a bale of goods"), a term applied generally to all Afghans engaged in trade and particularly to the group known specially as Povindahs, whose territory extends along the western Sulimán range between the head-waters of the Gomul and Lora rivers. These comprise ten main sections, who have always lived mainly by the caravan trade which they have organised between Afghanistan and India. In times of tribal or border warfare all went armed and had often to fight their way through hostile or predatory bands on the routes between their territory and the Indus valley. The Povindahs appear to be a branch of the Ghilzais, whose domain borders theirs on the west.

Powell, ROBERT STEPHENSON SMYTH BADEN, general, was born at Oxford on February 22nd, 1857, and educated at the Charterhouse. His father, the Rev. BADEN POWELL (1796-1860), was a distinguished physicist and held the Savilian Chair of Geometry at Oxford for thirty-three years. The general joined the 13th Hussars in 1876 and served in India,



GENERAL BADEN POWELL.

(Photo: Maull & Fox, Piccadilly, W.)

Afghanistan and South Africa. He was mentioned in the despatches in connection with the operations in Zululand in 1888, and from 1890-3 acted as Assistant Military Secretary at Malta. In 1895 he was in command of the Native Levies in Ashanti,

when he was promoted Lieutenant-Colonel. In *The Downfall of Premph* (1896) he gave a graphic account of the expedition which resulted in the deportation of the sable monarch to Sierra Leone. Baden Powell played a prominent part in the campaign in Matabeleland in 1896-7, of which he wrote a lively history. Promoted from the 13th Hussars to the command of the 5th Dragoon Guards in 1897, it fell to his lot to undertake the defence of Mafeking in the Boer War. From October 12th, 1899, when the siege began, to May 18th, 1900, when it was raised, he not only kept the enemy at bay but maintained the spirits of the besieged by the versatility and resourcefulness of his strategy. His brilliant conduct so impressed the popular fancy at the time that at least 40 different "patriotic buttons" with his portrait were produced, in addition to busts, medallions, cups, brooches, spoons and vases, besides biscuits and transparent soap, all bearing commemorative inscriptions. The public, in short, went mad over the achievements of the gallant colonel (as he then was) and the word "to maffick" was invented to describe their behaviour. He took part in the later operations of the war and was promoted major-general in 1900. He afterwards organised the South African Constabulary and from 1900 to 1903 was inspector-general of the Transvaal Police, and in 1903 was appointed inspector-general of cavalry. He is an expert on every branch of cavalry business, especially scouting and vedette work, upon which he has published what are standard books. His favourite mottoes give some clue to the extraordinary success of his career—"A smile and a stick will carry you through any difficulty in the world"; "Don't hurry; patience gains the day"; "Softly, softly, catchee monkey!"

Power, in engineering, is the rate at which work is done by any motor. If an engine is capable of doing 33,000 foot-pounds of work per minute, it is said to develop one horse-power, which unit was originally intended to represent the rate of the working of a horse. In the C.G.S. (centimetre-gramme-second) system the unit of power is the watt, which is ten mega-ergs per second; this is equivalent to a current of one ampère working through a resistance of one ohm and is equal to $\frac{7}{11}$ horse-power.

Power, in law, an authority given by one person to another to act for him, or to do certain acts, such as granting leases, raising portions, or the like, also to modify the use of an estate which he has at his disposal; in short, it may be aptly defined as "an authority enabling one person to deal with an interest which is invested in another." A power of attorney is a deed by which a person authorises another to act for him. If M, for instance, had imperative occasion to leave his country for a year, he might give N a power of attorney to represent him during his absence.

Powers, **HIRAM**, sculptor, was born, the son of a farmer, on June 29th, 1807, at Woodstock, Vermont, United States. He received some education

at Cincinnati, but had to go to work young for a living. He acted in various subordinate capacities for a few years, being librarian in a hotel, clerk in a store, apprentice in a clock and organ factory, where he became an adept in practical mechanics, and finally modeller in wax to the Western Museum in Cincinnati. In this last situation he "found himself" and mastered the arts of modelling and casting. Removing to Washington in 1834, the President and leading statesmen sat to him, his handiwork being generally admired. In 1837 he was enabled to go to Florence, where he made his home for the rest of his life and where he died on June 27th, 1873. Among his finest busts were those of Washington, Calhoun, Daniel Webster, John Quincy Adams, Andrew Jackson ("Old Hickory") and Van Buren, but his real power was shown in his ideal statues, those of "Eve" (1838), which Thorwaldsen greatly praised, "The Greek Slave" (1839), "The Fisher Boy" (1846), and symbolical figures of "California" and "America" being justly celebrated. It is said that it was on the strength of Hiram Powers' opinion of his son's drawings that Dr. Leighton finally decided to allow the youth who afterwards became Lord Leighton of Stretton and President of the Royal Academy to pursue an artistic career.

Powhatans, North American Indians, a branch of the Algonquian family, formerly the dominant people in the present states of Virginia and Maryland. All appear to be now extinct, but the name will always be remembered in connection with the romantic episode of Captain John Smith, who was saved from a cruel death by Pocahontas, daughter of a Powhatan chief. Descendants of their union are said still to survive in Virginia.

Poynings, **SIR EDWARD**, Lord-deputy of Ireland, born in 1459, only son of Robert Poynings, carver and sword-bearer to Jack Cade, who was killed at the second battle of St. Albans, 1461. Brought up by his mother, Elizabeth, only daughter of William Paston, among whose *Letters* some of her own are to be found, Poynings became a leader in Buckingham's insurrection against Richard III. in 1483. He had to leave the country and, allying himself with Henry Earl of Richmond in 1485, landed with Henry at Milford Haven. After serving in the Netherlands he was made Governor of Calais and was sent to effect Perkin Warbeck's expulsion from Burgundy. Ireland was disaffected towards Henry VII. It had a parliament embodying the representative principle, and Gerald Fitzgerald, Earl of Kildare, the Lord-deputy, was allowed to rule over the country. But the Geraldines had supported Lambert Simnel and Warbeck, and the king resolved to stamp out all treasonable plots. His second son, afterwards Henry VIII., was made viceroy and Poynings the prince's deputy. Poynings landed at Howth on October 13th, 1494, and, accompanied by Kildare, started on an expedition to punish the chieftains in Ulster who had aided Warbeck's invasion when he discovered Kildare was plotting against his life. He abandoned the expedition and went to Drogheda, where he summoned a parliament which proved one of the most important

in the country's history. It met on December 1st, 1494. After attainting Kildare it was compelled to pass the measure known as Poyning's Act, or the Statutes of Drogheda. Under this Act the Irish administration became dependent upon the Crown and the privy council; judges and others held office not by patent but during the royal pleasure; it was made illegal to carry weapons and high treason to incite the people to carry arms, and the statutes forbidding marriage, or even intercourse, between the English colonists and the Irish (which had been so cruelly enforced) were re-enacted. All laws made in England were to be in force in Ireland also; no parliament was to be summoned except under the great seal of England, and no Acts were to be valid unless first submitted to the English privy council. These measures were slightly modified in Queen Mary's reign and formed the basis for the government of Ireland till the time of the Union. Poyning's also tried, unsuccessfully, to reform the Irish finances. When Warbeck blockaded Waterford the town held out for eleven days and on Poyning's arrival the impostor fled to Scotland, where James IV. gave him the Lady Katherine Gordon, daughter of the Earl of Huntley, in marriage and made an unsuccessful invasion of England on his behalf. Having apparently restored order Poyning's returned to England in 1496, became Warden of the Cinque Ports and was afterwards appointed to conduct Katherine of Aragon to London. He married a daughter of Sir John Scot, Marshal of Calais, and was continually employed in military and diplomatic service under Henry VIII., being present at the Field of the Cloth of Gold in 1520. His last years were spent at his manor of Westenhamer, Kent, where he rebuilt the castle and died in October, 1521.

Leighton, then engaged upon his "Procession of Cimabue's 'Madonna,'" permitted him to work in his studio and to draw from his models—in England (more systematically) in 1854-6 and in Paris under Gleyre in 1856-9. He first exhibited at the Royal Academy in 1862, was elected an Associate in 1869 and a full member in 1876, succeeding Sir J. E. Millais in the Presidentship in 1896. He was Slade professor at University College, London, from 1871 to 1875; Director for Art and Principal of the National Art Training School at South Kensington from 1876 to 1881; and Director of the National Gallery, London, in succession to Sir Frederick Burton from 1894 to 1905. His chief works include "Israel in Egypt" (1867), "Perseus and Andromeda" (1872), "Atalanta's Race" (1876), "A Visit to Æsculapius" (1880), "The Meeting of Solomon and the Queen of Sheba" (1891), "The Ionian Dance" (1899), and "The Cave of the Storm Nymphs" (1903), besides cartoons for mosaics of "St. George" and "St. David" for the Houses of Parliament, designs for the dome of St. Paul's and decorations for the Victoria and Albert Museum at South Kensington. He was knighted when he became P.R.A., and created a baronet in 1902. Sir Edward published *Ten Lectures on Art* in 1879, and edited Messrs. Cassell and Company's *Illustrated Catalogue of the National Gallery*.

Pozsony. [PRESSBURG.]

Pozzo di Borgo, CARLO ANDREA, diplomatist, was born at Alata, near Ajaccio, Corsica, on March 8th, 1764, and was educated for the law at Pisa. In early life he had been a friend of Napoleon, but in a few years he became his bitterest enemy,



"ISRAEL IN EGYPT" (BY SIR E. J. POYNTER, P.R.A.).

Poynter, SIR EDWARD JOHN, painter, was born in Paris on March 20th, 1836, and was educated at Westminster and Ipswich Grammar School. He studied art in Rome in 1853—where Frederick

regarding him as the scourge of humanity, and devoted his life to compass his ruin. During the brief period that Corsica was under a British viceroy Pozzo di Borgo was President of the Council,

and when the British retired from the island returned with them to London (1797). Henceforth his mission was to form coalitions of European powers against Napoleon. With this object he entered the Russian service in 1803, but after the battle of Jena he withdrew first to Vienna and then to London. Recalled to Russia in 1812 he gained Bernadotte, the Swedish Crown Prince, over to his cause, was present at Waterloo, and signed the Treaty of Paris in 1815 as Russian ambassador. From 1826 to 1835 he represented the Tsar at Paris, where he died on February 15th, 1842.

Pozzuoli (ancient *Puteoli*), a town of Italy, 7 miles W. of Naples, on the north shore of the bay of the same name to the west of the Gulf of Naples. The harbour, sheltered by Posilipo on one side and Misceno on the other, does a fair amount of coasting trade and in early times was one of the chief ports of Rome. The chief interest of the place is centred in the grand ruins, which include the Serapeum, or Temple of Serapis, bearing traces of submergence in the sea, and the vast amphitheatre, popularly known as the prison of St. Januarius, from the tradition that the saint and his followers were sentenced to fight with wild beasts there. The cathedral of St. Proculus, occupying the site of a temple to Augustus, contains the tomb of Pergolesi. To the west of the town is the engineering establishment erected in 1890 by the Armstrongs of Elswick. In the vicinity of Pozzuoli are many places of literary interest, such as Avernus, the reputed entrance to the infernal regions, really a crater lake giving off at times unpleasant sulphurous vapours; Baia, the holiday resort of the Roman nobles, the subject, too, of one of Turner's noblest pictures; and Cumæ, where the dread Sibyl, or prophetess, resided. A volcanic sand or earth, found in the neighbourhood, forms, under the name of Pozzuolana, an ingredient of Roman or hydraulic cement. Pop. (1901), 17,140.

Præd, WINTHROP MACKWORTH, poet, was born in London on July 26th, 1802, and was educated at Eton and Trinity College, Cambridge. At Eton he signalled himself by editing *The Etonian*, described by Sir George Otto Trevelyan as "a product of collective boyish effort unique in its literary excellence and variety," and by founding a boys' library. At Cambridge his career was brilliant in the extreme. He thrice won the Browne medal and twice the Chancellor's for English verse; he was bracketed third in the classical tripos in 1825, took a fellowship in 1827, and the Seatonian prizes in 1830. He was called to the bar in 1829, became M.P. for St. Germain's next year and, that rotten borough having been abolished, was elected for Great Yarmouth from 1835 to 1837, and represented Aylesbury from 1837 till his death in London on July 23rd, 1839. From December, 1834, to April, 1835, he was secretary to the Board of Control and he was also appointed deputy high steward to the University of Cambridge. He was an accomplished writer of *vers de société*, in which his touch was of the lightest, his humour polished, and his satire rapier-like in its keen thrust. In such poems as "Quince" and "The Vicar" he reached the highest

level, and the "Red Fisherman" evinced powers of imagination of no mean order.

Præfect, the name of several civil and military officials in ancient Rome. The præfect of the city was the deputy of the chief magistrate—whether king, dictator, or consul—during his absence from the city. It was only, however, in the event of all the chief magistrates being absent that he was appointed. His main duty was to preserve the peace and his modern analogue is the Head Commissioner of Police, with supervision of the streets, markets, and public buildings and summary powers over rioters and slaves. Judicial præfects were appointed under the Republic to administer justice in the towns of allies, but when all Italy received the Roman franchise the office lapsed. Prætorian præfects were appointed over the Imperial bodyguard. They held office immediately from the emperor, of whom they were the representative and sometimes the rival. Under Constantine the office was deprived of its military character and transformed into a purely civil office, though the highest in the empire. The præfect of the allies was in command of the contingents to the Roman forces provided from the provinces in alliance with Rome. The title of præfect also belonged to the commander of the fleet, to the chief of the engineers, to the head of the commissariat (though only from A.D. 8 to 14) and to the Viceroy of Egypt.

Præmunire, an offence against public order intimately connected with the political history of England and the subject of many stringent statutes long since dormant. It arose in the 14th century out of an attempt to restrain the Papal authority from disposing of ecclesiastical patronage to the prejudice of the lawful patron and also to discourage the reference of cases to the Roman Curia rather than the courts of the country. It takes its title from the words of the writ preparatory to the prosecution thereof, "*præmunire facias* A. B." (i.e., cause A. B. to be forewarned) "that he appear before us to answer the contempt wherewith he stands charged, which contempt is particularly recited in the preamble of the writ." The chapter of a cathedral church incurs liability to "a præmunire" if it fail to elect as bishop of the see the person recommended by the sovereign to that office. The penalties were severe and included the loss of civil rights, forfeiture of lands and goods and imprisonment during the royal pleasure.

Prætor, a Roman officer of state. Down to 367 B.C. the title was applied to the consuls, but after that date the office was made separate and the prætor (who was a patrician) was a kind of third consul. He had the curule chair, the imperium (military power, in virtue of which he could levy troops and even in certain circumstances command them), and was attended by six lictors. At a later period the prætor became mainly a judge and two were appointed—the *prætor urbanus*, who dealt with city affairs and could not go more than ten miles from its walls, and the *prætor*

peregrinus, who dealt with cases in which Romans had disputes with strangers and who administered a system of equity. Other prætors were appointed as the tide of conquest spread, so that by the time of Julius Cæsar there were sixteen. Under the Empire the number varied from twelve to sixteen.

Prætorian Guard, a body founded under the Roman Republic to guard the commander (prætor) and continued under the Empire to protect the emperor. Augustus raised the strength of the *cohortes prætorie* to three cohorts and later to nine with a troop of horse. Tiberius brought the whole force to Rome and established them in the *castra prætorie*. Vitellius formed sixteen cohorts of 1,000 each, and the prætorians received double pay, many privileges of extra rank and the like, and a gratuity of £150 upon retiring after 12 to 16 years' service. The prætorian prefect was a man of much importance, and the whole body became a formidable political power, making and unmaking emperors at will. In course of time they were pampered to such a degree that they waxed insolent, murdered Pertinax, put up the Empire to auction and knocked it down to the highest bidder, Didius Julianus, in A.D. 193. They were abolished by Constantine the Great in 312.

Pragmatic Sanction, in European history, signified at first certain decrees of the Byzantine emperors regulating the interests of their subject provinces and towns. Afterwards it was applied to a decree as to Church affairs issued by the head of a legislature. Thus, Charles VII. in 1438 secured the rights of the Gallican Church in accordance with the decrees of a Council at Basel by a Pragmatic Sanction and a Diet of Mainz in 1439 issued a similar instrument. The name was also applied to the arrangement by which the Emperor Charles VI. secured his dominion to his daughter Maria Theresa, thus causing the War of the Austrian Succession. In 1759 Charles III. of Spain issued a Pragmatic Sanction by which he ceded the kingdom of Naples to his third son.

Prague (German, Prag; Bohemian, Praha), the capital of Bohemia, on both banks of the Moldau, 155 miles N.W. of Vienna. On the left bank are the Hradschin and the Kleinseite (Little Prague) and the chief industrial quarter; on the right are the Altstadt and Neustadt (the principal commercial centres), the Josephstadt (the former Ghetto) and the Wischehrad. The river is crossed by several bridges, including the famous Karlsbrücke, which is closed at each end by an ancient gate tower and the buttresses of which support statues of saints, among them that of St. John Nepomuk, the Bohemian patron-saint, which is the object of many pilgrimages. Among the chief public buildings are the Wischehrad (or citadel), the old palace of the kings, the palace of Wallenstein, the cathedral of St. Veitz or Vitus, the Teynkirche (associated with the memories of Huss and Tycho Brahe), the Kreuzherrenkirche, or Church of the Knights of the Cross, modelled on St. Peter's, the palace of Count Clam Gallas, the Rudolfinum (containing a picture gallery, industrial museum

and conservatory of music), the Pulverthurm ("Powder Tower," a relic of the old wall between the Altstadt and Neustadt), the Nostitz Picture Gallery, the Bohemian National Museum, the Belvedere Palace and the old Town Hall. The Carolinum, or university, for which Prague has been celebrated throughout its history, was founded by Charles IV. in 1348, and attached to it is the Clementinum, with a fine library. The manufactures comprise machinery, cast-iron goods, metal ware, chemicals, glass, cotton, calico, linen, silk, leather, gloves, railway waggons and cars, furniture, jewellery and gold and silver ware, besides milling, brewing, printing and lithography. Prague was founded in the 8th century by the Bohemian princess Libussa and gradually grew in prosperity and influence until, in the 14th century, it became the most important town in Germany. Espousing the Hussite cause it suffered from the consequent disturbances of rival factions, but recovered prestige under Rudolf II. (1576-1612), when Copernicus, Tycho Brahe and other great men flocked to it. It underwent another period of trial in the Thirty Years' War and was afterwards stormed in 1741, 1742, and 1744, and besieged in 1757. In 1848 its Liberal sympathies led to another attack, and it was seized, but without bloodshed, in 1866, when the treaty between Prussia and Austria was signed there. Once a city in which German influence was predominant, Prague has now become a stronghold of Czech sympathies and aspirations. Pop. (1900), 204,478, or 385,238 including the suburbs.

Prairies, the vast level or slightly undulating treeless areas occupying a large part of the northern and central United States to the east of the Rocky Mountains. They are characterised by a fertile soil, often of considerable depth, and are found where the rainfall is comparatively heavier than in portions of the adjoining forest-covered tract. Their treelessness therefore cannot be ascribed to the want of water and is probably due to the physical qualities of the soil, the fineness of which favours the growth of grasses rather than of trees. Within living memory they were covered with millions of bisons (buffaloes), but the animals have disappeared before the rifle of the red man and the hunter and the advance of what is called civilisation. It appears that they are never described locally as plains, this term being applied to the treeless regions farther west.

Prairie Dog (*Cynomys ludovicianus*), or BARKING SQUIRREL, a small American rodent from the prairie regions of the western United States. Some authorities reckon a second species (*C. columbianus*), from the west of the Rocky Mountains. They are gregarious animals, and their burrows are called prairie towns or villages from the mounds which are thrown up in every direction at distances of twelve or fifteen feet apart. A beaten path runs from burrow to burrow, evidencing the sociable disposition of the animals. At the mouth of every burrow the hillock formed by the excavated earth is used by the occupant as a watch tower. They received their name from a supposed

resemblance of their voice to the barking of a small dog. These animals are about a foot long, stoutly built, with reddish-grey fur. They feed on roots and grains. The burrowing-owl and the rattlesnake are constantly found in prairie towns. The former



PRAIRIE DOGS.

probably comes for shelter, the latter for food. According to the latitude of their dwellings the Prairie Dogs are more or less subject to torpidity during the winter.

Prairie Hen. [GROUSE.]

Prakrit (*Prakrita* = "natural," "artless"), the collective name of all the Aryan languages of India intermediate between Sanskrit and the Neo-Sanskritic (Gaurian) tongues. The earliest specimens are the rock and pillar inscriptions of the Buddhist King Asoka, of the 3rd century B.C.; while the oldest grammar was written by Vararuchi in the 1st century B.C. Several known varieties include the Shabbazgarhi and Girnār, the oldest and nearest to Sanskrit; Pali; Jaina of the Bhagvati, the sacred book of the Jains; Paisachi; Shauraseni, the chief vernacular used in the Hindu drama; Maharashtra, allied to, if not the source of, the western Gaurian tongues (Sindhi, Panjabi, Gujarati, Marathi); and Magadhi. The Prakrit dialects, all of which are still highly inflectional, were current generally from about 600 B.C. to A.D. 600 or 700, merging gradually in the modern vernaculars.

Praxiteles, the great Greek sculptor, flourished at Athens in the 4th century B.C. Little is known of his life, and most of his works have perished; but in 1877 his "Hermes Carrying Dionysus" was discovered at Olympia. His reputation was derived from his statues of Aphrodite at Cnidus and other places, of Dionysus at Elis and Athens, of Eros at Thespiae, and from several Apollos. He was, *par excellence*, the master of grace and womanly beauty, while his handling of marble is believed to have been unsurpassable. He knew the utmost possibilities of its surface texture and it was for this reason chiefly that he disliked the harder and less amenable bronze.

Prayer-Book. The full title of the English Prayer-book shows that, besides furnishing forms of "Common Prayer" (i.e., Morning and Evening Prayer), it is intended to satisfy the other require-

ments of public worship and secure the due celebration of the various rites and offices of the Church. It is, in fact, a compilation, the different parts of which fulfil the functions of the Breviary, Missal, Pontifical and Manual or "Prymer" on which they are severally based. The task of adapting these works of Roman Catholic devotion to the needs of Protestant congregations was undertaken by the English Reformers, under the lead of Archbishop Cranmer, in the last years of Henry VIII.'s reign. The first outcome of their efforts was a translation of the Litany, revised by Cranmer in 1544. This again appeared in English, together with the Creed, the Lord's Prayer, the Ten Commandments and sundry Canticles and Collects, in the "King's Prymer" of 1545. After the death of Henry VIII. the work of forming an English Prayer-book was carried on with increased energy and zeal. The "Order of Communion" (1548), a temporary production adapted to the administration of the sacraments in both kinds, which was now for the first time enjoined, was speedily followed by the First Prayer-book of Edward VI. (1549), containing all the services of the Church in a revised form. Although the First Prayer-book was received with general favour, the influence of Martin Bucer, Peter Martyr, and other foreigners of Calvinistic views, soon caused a demand for further changes. Reverence for antiquity was wholly absent from the minds of those who drew up the Second Prayer-book of Edward VI. (1552); their sole desire was to approximate as closely as possible to the teaching of Geneva. Most of the differences between the present Prayer-book and that of 1549 are due to alterations made at this period. The point to which a return was made after the accession of Elizabeth was not so far from that of 1552 as might perhaps have been anticipated. At the Hampton Court Conference (1604) a form was adopted which was nearly the same as that now in use. Few changes were made beyond the addition of certain thanksgiving prayers and the latter part of the Catechism. "Laud's Prayer-book," which in some points returned to the First Prayer-book of Edward VI., was introduced into Scotland in 1637, but the attempt to enforce its use led to a revolution, which was prefaced by the familiar incident of Jenny Geddes's hurling her fauld-stood at the Bishop of Edinburgh, when an attempt was made to read from the book in St. Giles's Church on July 23rd, 1637. Under the Commonwealth the use of the English Prayer-book, whether in public or private, was made a penal offence. As a result of the Savoy Conference (1661), a discussion between twelve bishops and twelve Presbyterians, some further alterations were made, but they all showed the predominance of the ecclesiastical party. The use of the revised Prayer-book, which was now reduced to the form in which we possess it, was enjoined by the Act of Uniformity in 1662. The "Sealed Books" or printed copies preserved at all cathedrals, in the Law Courts, and in the Tower of London, remain the standard for determining the genuine text. The attempt to introduce further modifications in 1689 was opposed by Convocation and fell to the ground.

Praying Insects, a family of Orthoptera known as Mantidae. Their popular name is derived from their habit of standing upon their four hind-legs with the front pair raised in the air as if in prayer or preaching. The species are usually of considerable size, those of an inch long being comparatively small, and occur in tropical countries, a few being found in the south of Europe, where the commonest forms are *Empusa pauperata*, *Mantis religiosa* and *Mantis oratoria*, the first two being from two to two inches and a half long, the third somewhat shorter. Many exotic species present extraordinary features. In some the femora and in others the prothorax are developed into leaf-like processes. The coloration of living specimens is generally beautiful, especially the delicate grass-green which distinguishes so many of them. The species that frequent deserts are sober-coloured. The superstitious in all ages have ascribed a religious significance to their attitude. The strayed wanderer might learn his road by watching the direction in which the forelimbs pointed. When St. Francis Xavier saw one progressing with its fore-legs raised in devotion, he bade it sing the praise of God, which it forthwith did in a beautiful canticle. The creature in its customary attitude is in fact very far removed from a devotional frame, since the fore-legs are really powerful raptorial organs from which the prey would not have the slightest chance of escaping. They also fight with one another and have been known even to draw blood from a human assailant.

Precedence (Latin, *precedere*, "to go before"). "Precedence none sure will claim in hell" wrote Milton, but in polite society the fitness and convenience of recognised rules are so generally realised that even so great a commoner as W. E. Gladstone had to give place to lords of his own creating. *The Order of all Estates and Nobles and Gentry of England*, 1339, was the first issued in point of date, but precedence in England rests mainly upon the *Act for placing the Lords*, a statute passed in the thirty-first year of Henry VIII., 1539, which confirmed pre-existing law and usage. When disputes arose as to the newly-created order of Baronets James I. issued decrees, in 1612 and 1616, placing them after the sons of peers. As all honours are conferred by the Sovereign, so with him the decision rests, usually with the advice of Garter King of Arms in England or the Lyon Court in Scotland, whenever questions arise. Even yet, however, some anomalies have not been determined. One of the most singular was decided by Royal Warrant in 1906 when the Prime Minister was given rank next after the Archbishop of York and by it official sanction was given to a title long in use. Persons of the same rank follow the order of the creation of their rank, younger sons of each preceding rank coming next after the eldest son of the succeeding rank. Wives and widows rank among each other according to their husbands' rank, but professional or official position confers no precedence upon the wife or child of the holder of it. Precedence is derived solely from father or husband, unless the female is a peeress in her own right.

Unmarried women take rank with the eldest son, whose wife precedes her sisters-in-law. Women married to commoners retain the precedence of their birth. The professions have their own relative ranks, which confer no general social precedence, hence no rank in the Navy or Army gives the holder of it precedence outside these professions. On ceremonial occasions official rank often places the holder above those of a higher order in Civil precedence, but men of official rank having higher personal precedence are placed according to that precedence.

The following table shows the order of precedence recognised on all occasions in England:—

The King.	
The Prince of Wales.	
The King's younger Sons.	
" Grandsons.	
" Brothers.	
" Uncles.	
" Nephews.	
Archbishop of Canterbury, Primate of all England.	
Lord High Chancellor, or Lord Keeper, if a Peer.	
Archbishop of York, Primate of England.	
The Prime Minister.	
Lord Chancellor of Ireland.	
Lord High Treasurer	
Lord President of the Privy Council	} if Peers.
Lord Privy Seal	
Lord Great Chamberlain	} above all Peers of their own degree.
Lord High Constable	
Earl Marshal	
Lord High Admiral	
Lord Steward of H.M. Household	
Lord Chamberlain of H.M. Household	
Dukes.	
Eldest Sons of Dukes of the Blood Royal.	
Marquises.	
Dukes' eldest Sons.	
Earls.	
Younger Sons of Royal Dukes.	
Marquises' eldest Sons.	
Dukes' younger Sons.	
Viscounts.	
Earls' eldest Sons.	
Marquises' younger Sons.	
Bishops of London, Durham, and Winchester.	
English Bishops according to seniority of consecration.	
Secretaries of State, if Barons.	
Barons.	
Speaker of the House of Commons.	
Commissioners of the Great Seal.	
Treasurer of the Household.	
Comptroller of the Household.	
Master of the Horse.	
Vice-Chamberlain of the Household.	
Secretaries of State and Chief Secretary to the Lord-Lieutenant	
of Ireland under the degree of a Baron.	
Viscounts' eldest Sons.	
Earls' younger Sons.	
Barons' eldest Sons.	
Knights of the Garter and of St. Patrick.	
Privy Councillors.	
Chancellor of the Exchequer.	
Chancellor of the Duchy of Lancaster.	
The Lord Chief Justice.	
Master of the Rolls.	
Lords Justices of Appeal.	
Judges of the High Court of Justice.	
Bannerets made under the Royal banner in open war.	
Viscounts' younger Sons.	
Barons' younger Sons.	
Sons of Lords of Appeal in Ordinary.	
Baronets.	
Bannerets not made by the King in person.	
Knights Grand Cross of the Bath.	
Knight Grand Commanders of the Star of India.	
" Grand Cross of St. Michael and St. George.	
" Grand Commanders of the Order of the Indian Empire.	
" Grand Cross of the Royal Victorian Order.	

Knight Commanders of the Bath ; of the Star of India ; of St. Michael and St. George ; of the Order of the Indian Empire ; of the Royal Victorian Order.
 Knights Bachelors.
 Commanders of the Royal Victorian Order.
 Judges of County Courts and of City of London Court.
 Sergeants-at-Law.
 Masters in Lunacy.
 Companions of the Bath ; of the Star of India ; of St. Michael and St. George ; of the Order of the Indian Empire.
 Members of the Fourth Class of the Royal Victorian Order.
 Companions of the Distinguished Service Order.
 Eldest Sons of the younger Sons of Peers.
 Barons' eldest Sons.
 Eldest Sons of Knights, according to their fathers' precedence.
 Members of the Fifth Class of the Royal Victorian Order.
 Barons' younger Sons.
 Knights' younger Sons.
 Esquires.
 Gentlemen.

The Scale of General Precedence in Scotland (by Royal Warrant, March 11th, 1905); the Roll of Precedence in Ireland ; the Scale of General or Social Precedence of Ladies in England, in Scotland, and in Ireland, are also authoritatively set forth. The precedence of Diplomatic Agents is regulated by the Treaty of Paris, March 19th, 1815, Ambassadors ranking after members of the Royal family.

Precession. For a long period of time it has been observed that the positions of the celestial pole and the equator have altered. The pole of the equator, in fact, describes a small circle round the pole of the ecliptic and the intersections of equator and ecliptic—the equinoxes—move backwards on the ecliptic through a distance rather less than one minute every year. Hence the sun has to travel about one minute less each year before he reaches the same equinox again, i.e., he reaches that point rather earlier every year. Hence the phenomenon is known as the “precession of the equinoxes.” This precession has considerable effect upon the recorded positions of stars, since it increases their longitude by the amount of the precession and effects a change in their declinations and right ascensions. It takes about 26,000 years for the equinox to make a complete revolution. The cause of this movement is the attraction of the sun and moon on the bulging part of the earth at the equator, which thus alters the direction of the axis. The phenomenon of precession was first noted by Hipparchus in the 2nd century B.C.

Predestination, a term expressing the eternal purpose of God, whereby He preordains all that happens. This doctrine has divided Christians into two sections ever since the days when it was raised by Pelagius (about 415), who upheld the freedom of the will in opposition to Augustine. The latter maintained that all natural impulse to good ceased with the Fall and his system (which he elaborated with much intellectual skill) was accepted as the orthodox doctrine by the Council of Arausio (the modern town of Orange in the department of Vaucluse) in 529. The doctrine was carried to an extreme point by Gottschalk, a monk of the 9th century, and at the time of the Reformation it was upheld by John Calvin with an uncompromising austerity which has made “Calvinism” synonymous with the holding of predestinarian views. Robert Burns made the dogma the subject of scathing satire in his “Holy Willie's Prayer.”

Pre-emption. The Pre-emption Act, which came into force in the United States in 1841, confers on any person who has inhabited and improved a piece of public land a prior claim to obtain the same by purchase, provided that it does not exceed 160 acres. The price is uniform in all cases. Title to land is acquired more speedily in this manner than by means of the Homestead Laws.

Pre-existence, the doctrine that the individual soul existed in some other form before it became connected with the human body to which it is now attached. This view is the natural outcome of Pantheism, or at least of that form of it which teaches that all Spirit is self-subsistent and cannot be created or destroyed at the behest of a Divine intelligence. The correlative doctrine is that of Reincarnation.

Prefect, or PRÉFET, the chief administrative official of a department in France. The office was established in 1800. The prefect is appointed by the head of the State and is the medium of communication between the department and the Government. He is entrusted with the execution of the laws, the control of the police and administration and the appointment to the minor posts. He is assisted by a council. The word prefecture is employed to define the office and jurisdiction of the prefect, or the district under his supervision, or his official residence.

Pregnancy, SIGNS OF. Suppression of the menses is usually the first warning of the pregnant condition ; it is by no means an absolutely trustworthy sign, as such suppression may be due to other causes and a periodic flow sometimes occurs in spite of the fact that pregnancy exists. Morning sickness usually occurs during the second month of pregnancy and lasts until the fourth month. Changes in the breasts and increase in the size of the abdomen are manifested in the third month as a rule and “quickenings” may occur at about this period. The one certain sign of the existence of pregnancy (the detection of the sound of the fetal heart) is rarely observed by the physician much before the sixth month. The duration of pregnancy is usually about 275 days.

Prejevalsky, or PRJEVALSKY, NICHOLAS MIKHAILOVICH, traveller, was born at Kimbory, Smolensk, Russia, on March 31st, 1839. He served in the army for several years, teaching geography in the Warsaw military school from 1864 to 1866. In 1870-3 he travelled from Peking to the upper waters of the Yang-tse-Kiang, a brilliant feat of exploration which he described in his book on *Mongolia, the Tangut Country and the Solitudes of Northern Tibet* (1876), and which gained for him the Constantine medal of the Russian Geographical Society. He continued to travel and explore in Central Asia in 1876-7, 1879-80 and 1883-5. During the second expedition he re-discovered Lob-nor, a lake which no European had seen since the time of Marco Polo. Among his most valuable zoological discoveries were those

of the wild camel and the wild horse, the latter named after him *Equus przewalskii*. These expeditions were described in *From Kulja to Tianshan* (1879), *From Zaisan to Tibet* (1883), and *From Kiakhta to the Sources of the Yellow River* (1888). He was engaged on a fifth expedition, the objective of which was Lhasa, when he died at Karakol on Lake Issyk-kul on October 20th, 1888. The Russian Government ordered the name of this town to be changed to Prijevalsk in honour of the intrepid explorer.

Prejudice, an opinion or decision formed or arrived at without adequate and unbiased examination of the facts or arguments necessary to the formation of a just opinion. In law, the phrase "without prejudice" means without yielding one's rights or previous claims and is generally employed in communications or negotiations between the parties to a suit or dispute, implying that, in the event of the overtures falling through, nothing that has passed shall be taken advantage of in later proceedings. Thus, an offer made, "without prejudice" and expressly so stated, to pay part of a claim does not constitute an admission of any right to such payment, should the other side refuse to entertain the offer.

Premonstratensians, an order of regular canons founded in 1119 by St. Norbert. He was born about 1080, of a noble family, receiving an education suited to his rank, and lived for a time at the court of the Emperor Henry V. When he was thirty years old he sought ordination, afterwards embracing a strict rule of life. Distributing his patrimony amongst the poor he retired with thirteen companions to the forest of Concy, to a spot shown to him in a vision, hence called Prémontré. His purpose was to revive the primitive devotion of monasticism and the reformation of society. Added to the daily choral offices of the Church the special work of the community was the instruction of the laity and spiritual direction. The canons suffered great poverty at first, but their piety won them support, so that within thirty years they had grown and possessed one hundred abbeys in France and Germany. Known from their habit as the White Canons they came into England in the 12th century. Their first monastery, called the New House, was built in 1143 in Lincolnshire, the Abbey of Welbeck, Nottinghamshire, built in 1153, becoming the chief house of the Order. The English and Welsh abbeys were placed under the charge of the Abbot of Welbeck and at the time of the Dissolution they had thirty-five houses in England and six in Scotland, Dryburgh being one. Norbert was chosen Archbishop of Magdeburg, Germany, in 1127, and in 1582 was canonized by Gregory XIII. Many nobles were content to become humble lay-brothers in this Order, which gave the Church a number of bishops and at one time owned monasteries in all parts of Christendom as well as five hundred nunneries. They were proscribed at the Revolution. The last Abbot of Prémontré died in 1834 and but little now remains of their former importance.

Pre-Raphaelite Brotherhood, the name assumed by several young painters and sculptors who, towards the middle of the 19th century, revolted against the current conventionalism in art and determined to seek for inspiration in a close study of nature. The movement was probably due in larger measure to William Holman Hunt than to his younger associates John Everett Millais and Dante Gabriel Rossetti, who owed much—especially the latter—both to his precept and example. For long it was a much-vexed question who were the founders of the band of brothers and in 1886 Holman Hunt cleared up whatever doubt still existed by naming the original members. These were Hunt himself, J. E. Millais, D. G. Rossetti, Thomas Woolner the sculptor, Frederick George Stephens, the art critic, W. M. Rossetti (Dante Gabriel's brother) and James Collinson, painter in oils. The movement, however, was "run" (to use a later expression) by the first three. Others worked on P.R.B. lines, but, wrote Holman Hunt, "we had quickly seen that the magic name was likely to bring those into the circle who did not practically advance our object and we ceased to nominate fresh disciples. We saw that it was best that they should be judged by their works." Though not actually of it, John Ruskin rendered the Brotherhood yeoman service by his eloquent and enthusiastic pen. The name Pre-Raphaelite was chosen because the founders of the school considered that in his later years Raphael sought to model his style on that of Michael Angelo and Leonardo da Vinci without an independent study of nature, thereby departing from the example of his immediate predecessors. In later years a vigorous reaction set in against the relentless precision of the Brotherhood in favour of the Impressionistic school, whose excesses in turn pointed to a reversion to a modified Pre-Raphaelitism.

Prerogative, **ROYAL**, the particular pre-eminence enjoyed by a sovereign, in virtue of his or her office, over all other persons and even beyond the course of the common law. In Great Britain it embraces, among other privileges, the right of sending and receiving ambassadors, of making treaties and, in theory, of making war and concluding peace, of summoning Parliament and of refusing assent to a Bill. Generally the royal prerogative is exercised by delegations and only personally in the conferring of honours and a few other respects. Several of the privileges are technical merely and have been in abeyance for two hundred years and more. This in a constitutional monarchy is plainly inevitable.

Presbyopia. [EYE.]

Presbyterians, a body of Christians, whose theory of Church government presupposes the identity of the "presbyters" (Greek, *presbuteroi*, "elders") and "bishops" (*episkopoi*, "overseers," "guardians") mentioned in the Epistles and the Acts of the Apostles. They maintain that there was no distinction of office among the ministers commissioned by Christ to feed the flock of God, confute heretics, administer baptism and the Eucharist, and lead the prayers of the congregation;

and that the elevation of bishops to a higher rank was a gradual innovation which grew out of the choice of a permanent "moderator" or speaker of the presbytery. Modern Presbyterianism dates from the Reformation. The views of Luther and Calvin on this point were the same, but it is to the latter, who possessed a genius for organisation, that the Presbyterian form of government is due. In accordance with his scheme presbyters are chosen by the Council of State in consultation with the people, each receiving an allotted share of work. Calvin's views were adopted by the Reformed Churches of France and Scotland, the latter of which is now divided (excluding two small bodies, the Reformed Presbyterian Church and the United Original Secession Church) into two separate bodies, namely, the Established Church and the United Free Church (composed of the Free Church and the United Presbyterian Church, which amalgamated in October, 1900). The first presbytery formed in England was that opened at Wundsworth, in Surrey, in 1572, though there is evidence that a meeting-house had been built at Horningsham, in Wiltshire, six years earlier. The first Scots church in London dates from 1672. This was the body that met in Founders' Hall Court, Lothbury, for nearly a century, then in London Wall from 1764 to 1857, and finally in Canonbury. During the Civil War the great majority of the Puritans were Presbyterians and looked for guidance to the Westminster Assembly, but afterwards the Independents gained the ascendancy and Presbyterianism became discredited, although most of the Church livings were held by Presbyterian ministers up to the Restoration. Since that time the Presbyterians have not occupied a prominent position among English Nonconformists. On the Scottish disruption in 1843 the English presbyteries joined the English congregations of the Free Church. In 1876 they were all united under the title of the Presbyterian Church of England. In Ireland Presbyterianism is the largest denomination in the province of Ulster. In respect of organisation the principle of Presbyterianism is extremely simple. Every congregation elects its minister and office-bearers, who constitute the kirk-session. Within a given area the minister and one or more elders from each congregation constitute the presbytery of the district. A number of presbyteries, through their representatives, constitute a synod, and the General Assembly is the highest court and comprises the representatives, clerical and lay, of all the presbyteries within the country. Sometimes the intermediary court, or local synod, is dispensed with. The chairman for the year of the General Assembly is styled the Moderator. In the case of the Established Church of Scotland, however, the Crown is represented by a nobleman who is called the Lord High Commissioner.

Prescot, a town of Lancashire, England, 8 miles E. of Liverpool. The leading industry is the manufacture of watch movements, hour-, minute- and second-hands and watch-making tools, which was introduced in 1730. Watches also are made. Other manufactures are electric cables, cotton and

coarse earthenware, for the last-named of which the local clay is well adapted. The chief buildings are St. Mary's Church and the grammar school. The town's earliest charter dates from the reign of Edward III. (1335). John Philip Kemble, the actor, was born here on February 1st, 1757. Pop. (1901), 7,855.

Prescott, WILLIAM HICKLING, historian, was born at Salem, Massachusetts, on May 4th, 1796. He graduated at Harvard in 1814 and for a time studied law. After travelling in Europe, he determined, in spite of defective eyesight, the result of an accident in his college days which made him practically blind, to pursue a literary career, and in 1826 began his Spanish studies. In 1837-8 appeared *The History of Ferdinand and Isabella*, the success of which was general and instantaneous. This work was followed by *The Conquest of Mexico* (1843), and *The Conquest of Peru* (1847). In 1850 Prescott came to England and was made D.C.L. of Oxford, and in 1855 he published the first two volumes of a *History of Philip II.* which he did not live to finish. In 1857 appeared his continuation of Principal Robertson's *History of Charles V.* He died at Boston, Massachusetts, on January 28th, 1859.

Prescription (*Præscriptio*), a title to incorporeal hereditaments acquired by long and continued possession. Before the Prescription Act 2 & 3 William IV., c. 7, the possession required to constitute a prescription must have existed time out of mind or beyond the memory of man—that is, before the reign of Richard I.; but now the period of possession necessary to constitute a title by prescription is in many cases considerably shortened by the above Act. For example, uninterrupted enjoyment for a period of twenty years may confer a good title to the thing enjoyed.

Preservatives, FOOD, chemical preparations added to food, liquid or solid, for the sole purpose of keeping it fresh and wholesome by arresting fermentation or preventing bacterial decomposition. The oldest and best-known chemical preservative is salt, NaCl (sodium chloride). This has been used from time immemorial for the preservation of food, and in the correct quantities its addition is absolutely harmless, though when used in excess it produces marked symptoms of poisoning. Saltpetre, KNO₃ (potassium nitrate), has also been long used in meat-curing, and Alum, a crystalline compound of aluminium and potassium sulphates, having the formula AlK(SO₄)₂12Aq. is also well known as a food preservative. Coming to modern preservatives we have Boracic Acid, Borax, Formaldehyde, Glycerine, Salicylic Acid and others of less importance. Of all these Boracic Acid and Borax and mixtures of the same have received the greatest attention, since they have proved to be the most suitable. For many years prejudice against their addition to food was noticeable, until the necessity for a tasteless and harmless preservative of more powerful keeping properties than common salt became a requirement for the food supply of towns. In 1860, as the result of a Commission for the

investigation of the increase of infantile mortality. Dr. Lankester, the coroner for Middlesex, published a report pointing out that the increase was due to the use of sour milk for infant diet. Accordingly Glacialine, a harmless preservative, was introduced in 1876. Its manufacture was based on the boron salts, being itself, like common salt, neutral, and Professor Fleming, Sir George McLeod and others, having experimented with it, found it innocuous. This was the first use of modern preservatives and their daily employment since that date establishes their harmless nature. However, with the growing practice of the chemical supervision of food, analysts, who had previously been without experience of their effects and were ignorant of the fact that they were used deliberately for the purpose mentioned, when they discovered their presence in food as what they called a foreign substance took exception to their use and prosecutions ensued. No evidence, it should be borne in mind, has ever been given by a doctor or scientist based on actual research work which has proved injury to health in any single case. On the other hand, experts like Sir Benjamin Ward Richardson, Professor Virchow, Professor Tunncliffe, Professor Oscar Liebreich, and the well-known American chemists, Messrs. Chittenden and Gies, desirous of ascertaining the truth of the matter before venturing to express an opinion, carried out elaborate series of experiments, *in vitro*, on rabbits, dogs, children and men, and all came to the conclusion that, used in the quantities required for food preservation, the borons were harmless.

The conclusions drawn from their researches on the action of Boric Acid and Borax on the chemistry of digestion were as follows:—(1) The phosphorus metabolism is not affected, while phosphorus assimilation is slightly improved; (2) the body weight is slightly increased, while the fat assimilation is not affected; (3) with boric acid the percentage of nitrogen and phosphorus in the dry faeces was slightly decreased, and with borax they remained unaltered: in both cases the weight of the dry faeces remained the same; (4) no inhibitory effect upon intestinal putrefaction could be demonstrated; (5) both boric acid and borax are quickly eliminated, no cumulative action therefore being probable; (6) neither boric acid nor borax in any way affected the general health and well-being of the patients. On the strength of these facts the borons, as harmless additions to food, therefore take their place with salt, nitre and other chemical preservatives. It is interesting to note that since the research work alluded to, the late Alfred H. Allen, Public Analyst for the West Riding of Yorkshire, discovered the natural presence of boric acid in fruit and vegetables, thus finally disposing of the objection that borons were a purely mineral substance nowhere found in food. As a matter of fact, it is now ascertained that apples and pears contain as much as 0.016 per cent. of boric acid, H_2BO_3 , while other fruits, vegetables and plants contain varying quantities. Preservatives are indispensable in all countries which are unable to feed their inhabitants either, as in England, in consequence of pressure of population on the home means of subsistence, or, as in Norway,

because of the poverty of the soil, the paucity of pasture lands and the climatic conditions which check the growth of nutritious grains, save in a few favoured localities. In the United Kingdom, where there are great, densely-populated cities and towns, the necessities of life and what are called perishable provisions—for it is chiefly in respect of dairy produce that preservatives are used at all—have to be imported either from rural districts more or less distant, or from foreign countries as near as the Continent, or as remote as Canada and Australia. It is obvious that before such necessities can possibly reach the consumer, vast distances may have to be covered and weeks, and even months, have to elapse. In these circumstances unless some means are devised to keep the food sweet and wholesome an immense quantity must perish and incalculable monetary loss be inflicted on the producer, who, but for such safeguards, would be prevented from placing on the market the necessities of life in a perfectly sound condition within the purchasing power of the poorest classes.

Preserved Provisions. The increased production of preserved provisions is due not only to the poverty of large numbers of the community, extended campaigns and long voyages, but also to the unequal distribution of the areas in which food-stuffs are raised. This consideration led to the invention of means whereby substances might be caused to retain their odour, colour and nutritive value. These methods must be cheap enough to ensure a demand and be consistent with production on a large scale, in order to establish a remunerative industry. Meat, fish, vegetables, milk and other provisions are successfully preserved by several processes—drying, refrigeration, exclusion of air, the use of antiseptics and the McDoddie process of dehydration by means of exhaustion *in vacuo*. Drying is the oldest method. Cereals ripened in the fields and hard farinaceous and oleaginous seeds and nuts ordinarily keep until wanted for consumption. Meat, vegetables and succulent fruits are preserved in this way. Jerked beef, or charqui, of South America, is meat cut in pieces, from which the fat, bone and tendons are taken, powdered with maize meal and dried hard by exposure to the sun. Pemmican, originally a North American Indian preparation, was introduced into the British navy as an easily-produced food containing nutriment in the smallest space. Beef, the fat being entirely removed, is used for Arctic exploration. Ice as a retarder of putrefaction is a well-known refrigerator. Since 1875 frozen carcasses conveyed in cold-air chambers have been imported into Great Britain in increasing quantities from America, Australia and New Zealand. François Appert, a Frenchman, seems to have originated, in 1809, the method of preserving by excluding air. It has been developed and is used for tinned meats, soups, fruit, fish, etc. When the tin is filled, the cover, in which a pin-hole is left, is soldered on and it is placed in a solution of calcium chloride, which boils at a temperature of 270° F. The tin is immersed, for about three hours, to within an inch of the top, steam issuing through the pin-hole

by which the air is expelled from within, and the hole is rapidly closed with solder. It is then wholly immersed for a time, withdrawn, cooled and tested. The most familiar and oldest antiseptic is common salt, which takes the place of the juices it withdraws from the meat, though thereby the nutritive value of the food is lessened and it is rendered less digestible than fresh meat. [PRESERVATIVES.] Alcohol is used to preserve fruit; sugar in the making of jams, jellies and candied fruits; oil for preserving fish and vinegar for pickling succulent fruits and vegetables. The use of provisions in this form being general, it is obvious that purity in their preparation is essential. Hence when Mr. Upton Sinclair's novel called *The Jungle* revealed some of the conditions under which meat was prepared for the market, a universal sensation was created in 1906. Though meat-packing is one of the most important industries of Chicago, President Roosevelt, continuing his fight with the Trusts, instead of dismissing the revelations of *The Jungle* as incredible, instituted an independent inquiry, which demonstrated the need for immediate action. Chemicals, it was proved, had been used to render putrid meat odourless and tasteless. The conditions of its manipulation were a menace to the health of the consumer. The unfortunate employes were bullied or bribed into silence as to the condition of the establishments and the processes employed. At first the charges were dismissed as exaggerated and not until the packers realised that in a few days they had lost £4,000,000, and in some factories 60 per cent. of the workmen were no longer wanted, did they begin, with commendable alacrity, to improve their methods. After a stubborn fight in Congress an Inspection Bill was passed on June 30th, 1906, which, however, to the general anger and amazement, lacked the provision requiring the date of inspection to be stamped upon the tin, but contained a clause placing the cost of inspection on the Government, points insisted on by the packers, who presumably hoped that Congress would ultimately reduce the amount appropriated (£600,000) to pay for the cost of inspection and so render the Act nugatory.

PRESIDENT OF THE UNITED STATES, THE, is elected at intervals of four years by presidential electors who are elected by the people of the different States of the Union, the electors in every State being equal in number to that of the senators and Congressmen in that State. As a matter of fact, however, these delegates are always pledged to support the candidate nominated by the National Convention of either party. The President is commander-in-chief of the army and navy, and also of the militia when it is engaged in active service. It is his function to see that the laws are duly administered and every Bill passed by Congress requires his signature, unless his authority is overridden by that of a two-thirds majority in both houses. He grants pardons and reprieves (except in cases of impeachment) and makes treaties, subject to the approval of two-thirds of the Senate. The consent of the Senate is also necessary in the choice of ambassadors, consuls and

other officers, whose appointment is in his hands. The President's annual salary is \$50,000.

Pressburg (Magyar, Pozsony), a city of Hungary, beautifully situated on a height above the Danube, 34 miles E. of Vienna. When the Turks captured Buda in 1541, Pressburg became the capital of Hungary and so remained until Buda was restored to its former rank in 1784. It was the scene of the famous session of Parliament in 1687 when the Hungarians renounced their right to choose their king and accepted the hereditary succession. It continued to be the seat of the Diet until 1848. The Treaty of Pressburg between Napoleon and Francis I. of Austria was concluded here in 1805 and, four years later, Davoust bombarded the town for a month. The royal palace overlooking the town has never been restored since the disastrous fire of 1811, but among existing structures are the fine Gothic cathedral of St. Martin, in which the Hungarian kings were crowned, the old castle (now in ruins) of the kings, the Town Hall, the Landhaus or Hall of Diet, and the palace of the Archbishops of Gran. The industries comprise petroleum-refining, cabinet-making, and manufactures of dynamite, brushes, tobacco, paper, glass, musical instruments and machinery. Pop. (1901), 65,869.

Pressensé, EDMOND DEHAULT DE, theologian and politician, was born at Paris on June 3rd, 1824. He was educated at Lausanne, Halle and Berlin, and became minister of the Protestant Church of Taitbout in Paris in 1847. In 1854 he founded the *Revue Chrétienne* which he conducted for 37 years. His most important works were, *Histoire des Trois Premiers Siècles de l'Eglise Chrétienne* (1858-77), *L'Eglise et la Révolution* (1864), and *Jésus Christ, Son Temps, Sa Vie, Son Œuvre* (1866). These and other works were translated into English and German. In 1871 he was elected a deputy in the French Assembly and in 1883 a senator. He died in Paris on April 8th, 1891.

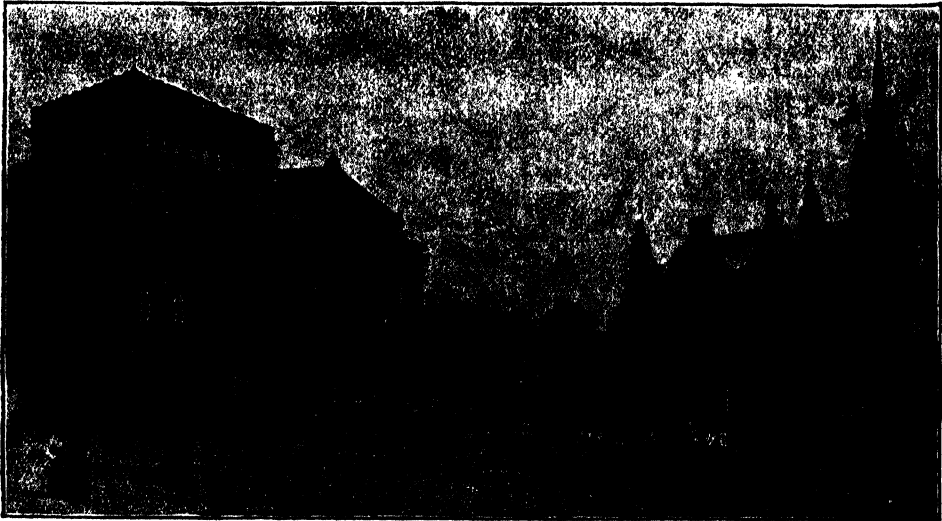
Pressgang. Impressment was a recognised means of recruiting the British navy from the reign of John to that of William IV. and, though it has now fallen into disuse, the laws regulating and thus sanctioning it have not been repealed. Sailors, fishermen, bargemen and, on urgent occasions, landmen were (with certain stated exceptions) liable to service between their nineteenth and their fifty-sixth years.

Prester John, the name given in the Middle Ages to a supposed Christian king and priest of great power and splendour. Otto, Bishop of Freisingen, makes him conquer the Persians and Medes in a great battle and attempt to reach Jerusalem. About 1165 a letter from "Presbyter Joannes" to Manuel, Emperor of the East, was circulated throughout Europe. Of this letter nearly 100 MSS. exist. In 1177 an epistle seems to have been written by Pope Alexander III. from Venice to "John, the illustrious and magnificent king of the Indies," regarding the establishment of a church and altar at Jerusalem. Gibbon and other

writers make the subject of the first of these letters Gur Khan, the king of Khitai of Cathay, who, however, was probably not a Christian; while the great Mongol conqueror Genghiz Khan is probably to be identified with later bearers of the name. Prester John's realm was at first supposed to be in Central Asia, but from the 14th century onwards it was placed in Africa, and he becomes thus almost certainly identical with the king of Abyssinia, who was a Christian.

Preston, a town of Lancashire, England, on the right bank of the Ribble, 27 miles N.E. of Liverpool. Its name is said to be a corruption of Priests' Town, in allusion to a settlement of Saxon priests. The site, however, was known to the

buildings are St. John's Church, the Roman Catholic church of St. Walpurgis, the Public Hall, the Town Hall in the Gothic from the designs of Sir Gilbert Scott, the Harris Free Library and Museum, the Newsham Art Gallery, the Harris Institute, the Grammar School in the Tudor, the County Hall and the Court House. There are several public parks and recreation grounds. Though the town has not much importance as a port, it contains docks that can be entered by vessels drawing 17 feet, the channel of the Ribble having been deepened from the quays to its outlet in the Irish Sea, a distance of 12 miles. "Proud Preston" has passed from a fashionable resort to one of the principal seats of the cotton trade. Other industries include iron- and brass-founding, engineering works, boiler and



PRESTON: FREE LIBRARY, MUSEUM, AND TOWN HALL.

(Phot.: Frith & Co., Reigate.)

Romans, for a Roman road crosses the river near here and Roman remains have been found. It is famed for its merchant guild festivals, celebrated every twentieth year, the earliest of which we have record being held in 1329. It suffered at times in the Border warfare, being partially burned down by Robert Bruce in 1323. During the Civil War it declared for Charles I., but was taken by the Parliamentary forces in 1643. In 1715 the followers of the Old Pretender proclaimed him at the Market Cross and in 1745 Prince Charlie was also proclaimed on November 25th, retreating through it ignominiously seventeen days later with the rump of his forces. Lady Hamilton, whom George Romney has immortalised and Nelson adored, and Sir Richard Arkwright were natives (though Ness in Cheshire is also given as the birthplace of Emma Lyon, afterwards Lady Hamilton). The principal

cotton machinery factories, biscuit-baking and shipbuilding. Pop. (1901), 112,982.

Prestonpans, a watering-place, of Haddingtonshire, Scotland, on the south shore of the Firth of Forth, 9 miles E. of Edinburgh. Once the chief seat of the salt trade in Scotland, this ancient industry has almost died out. The town has manufactures of bricks, tiles and pottery, besides brewing and soap-making. There are coal mines in the vicinity, but the oyster-beds, once prolific and yielding a variety called the Pandore, held in high esteem, though extending into the firth for six miles and measuring three miles in width, have ceased to be productive on the large scale. The town is in growing repute as a watering-place. On September 21st, 1745, Prince Charlie defeated the Royalists under Sir John Cope. An obelisk

commemorates Colonel James Gardiner (1688-1745), one of Marlborough's veterans and a deeply religious man, who fell in the battle. Pop. (1901), 1,721, greatly increased in the season.

Prestwich, a town of Lancashire, England, 4 miles N.W. of Manchester, the parish containing the borough of Oldham. It has important manufactures of cotton and is also a favourite residential quarter of Manchester merchants. The Gothic church of St. Mary, surrounded by fine old beeches, stands on an eminence commanding a fine view of the valley of the Irwell. Pop. (1901), 12,839.

Prestwich, SIR JOSEPH, geologist, the son of a wine merchant, was born at Clapham, London, on March 12th, 1812, and was educated privately and at University College, London. He entered his father's business, but gave up all his spare time to the pursuit of geology, especially studying the coal-fields at Coalbrookdale in Shropshire and the water-bearing strata around London. He was elected F.R.S. in 1853. At the period when the question of the antiquity of man was exciting universal interest he explored the Brixham Cave and visited the Somme Valley in France (1859) and concluded that man was contemporary with the Mammoth. In 1864 he was nominated to the Water Commission and in 1866 to that on Coal. In 1870 he became President of the Geological Society and, in 1874, Professor of Geology at Oxford, a chair which he held for fourteen years. He was knighted in 1896 and died on June 23rd of that year at Darent Hulme, his place near Shoreham, Kent. His chief works were *Geology, Chemical, Physical and Stratigraphical* (2 vols., 1886, 1888), *The Tradition of the Flood* (1895) and many papers of first-rate importance in the "Proceedings" of the Geological and Royal Societies.

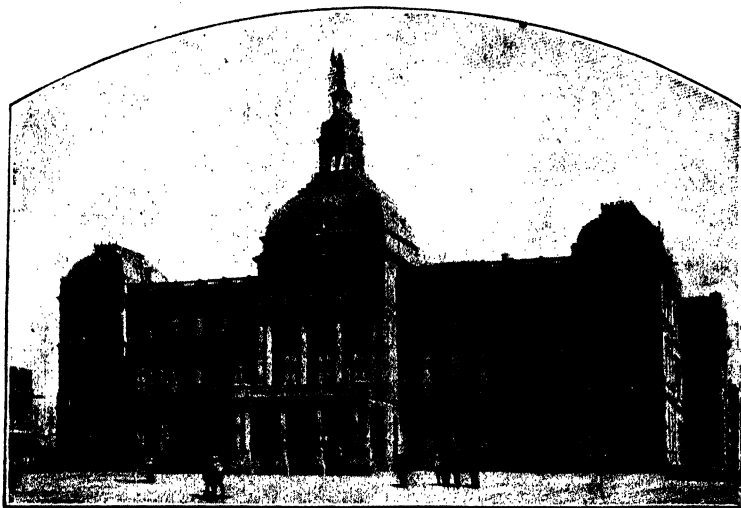
Prestwick, a watering-place, on the coast of Ayrshire, Scotland, 3 miles N. of Ayr. It is a place of remarkable antiquity, since the charter renewed by James VI. in 1600 expressly states that Prestwick had been a burgh for 617 years before (since the reign, that is, of Kenneth II.). Nowadays it is chiefly known for its two fine golf links, one of which was in high repute long before the revival of the game. It is a residential quarter in growing request. Pop. (1901), 2,800, increased largely during the season.

Presumption (*Præsumptio*), that which is presumed or believed in the absence of direct evidence to the contrary. A presumption has been classed as a violent, a probable, or a light presumption, according to the amount of weight which attaches to it.

Pretender. In the course of British history there have been several pretenders to the throne, but since the union of the English and Scots crowns the word has been specially applied to James Francis Edward Stewart, son of James II., who, in 1715, made an unsuccessful attempt to supplant the Hanoverian dynasty, and to his son, Charles Edward Louis Philip Casimir (Stewart), who made an equally unsuccessful though more heroic effort. The father was known as the Chevalier de St. George and also as the Old Pretender; the son as the Young Pretender and, also affectionately, as Prince Charlie. Both attempts, the latter especially, inspired an enormous number of Jacobite songs, mostly of marked beauty and feeling. The epigram of John Byrom (1692-1763) is the classic example of the men who faced both ways:—

God bless the King—I mean the faith's defender,
God bless—no harm in blessing—the Pretender;
But who pretender is and who is king,
God bless us all! that's quite another thing.

Pretoria, capital of the Transvaal Colony, South Africa, 30 miles N.E. by N. of Johannesburg. It lies about 4,480 feet above the sea in a fertile valley of the Magaliensberg Range, which here is pierced by the Aapies, a headwater of the



PRETORIA: THE RADZAAL.

(Photo: N. P. Edwards, Lit. lehampton.)

Limpopo or Crocodile River. Named after the Boer leader Pretorius, it was from 1855 (when

it superseded Potchefstroom in the rank) to 1900 capital of the South African Republic. It was occupied by the British under Lord Roberts on June 5th, 1900. It is spaciouly laid out with wide streets and boulevards at right angles to each other, the streets being bordered by running streams. The principal building is the Radzaal, an imposing structure crowned by a statue of Liberty, which was the Parliament House under the Boer régime. The surrounding forts erected by President Kruger's government have all been dismantled. White pop. (1904), 21,161 and (estimated) 15,000 natives.

Prévost d'Exiles, ANTOINE FRANÇOIS, novelist, was born at Hesdin, in the department of Pas-de-Calais, France, on April 1st, 1697. He was educated by the Jesuits and in 1721 became a Benedictine of St. Maur, but more than once ran away from his studies and enlisted as a soldier. To avoid arrest he passed six years in Holland and England. His first novel, *Mémoires d'un Homme de Qualité*, appeared in 1728. It was followed by *Cléland* (1732) and *Manon Lescaut* (1731), his masterpiece. The Abbé Prévost also translated *Pamela* and *Clarissa Harlowe*. Another novel of his which is still read is *Histoire d'une Grecque Moderne* (1741). He died at Courteuil, near Chantilly, on November 23rd, 1763.

Prévost-Paradol, LUCIEN ANATOLE, journalist and author, was born in Paris on July 8th, 1829, and educated at the Collège Bourbon and the École Normale, where H. A. Taine was a school-fellow. In 1855 he was professor of literature at Aix, but soon afterwards became a leader-writer on the staff of the *Journal des Débats*. During the following years he published a collection of literary and political essays—for one of which, *Anciens partis*, he was condemned to a month's imprisonment and a fine of 1,000 francs (£40)—and in 1865 was elected to the Académie, at the unusually early age of 35 years, in succession to Ampère, his rival being Jules Janin. His efforts to become a member of the Chamber were fruitless, but on June 12th, 1870, he accepted the post of minister plenipotentiary to the United States. His acceptance exposed him to bitter taunts of apostasy, in view of his former opposition to the Empire. These attacks, combined with the disasters of his country, unhinged his reason and he put an end to his life in Washington on August 11th, 1870.

Priam, the last king of Troy, was son and successor of Laomedon and Strymo (or Placia). By his second wife, Hecuba, he was father of Hector, Paris, Cassandra, and numerous other children. His fate was uncertain, but according to tradition the aged man perished before the altar of Jupiter in the final storming of the city by the Greeks.

Price, RICHARD, theologian, economist and politician, was born at Tynton, in Glamorganshire, Wales, on February 23rd, 1723. He became a Nonconformist minister in London and, in 1757, published his best-known work, the *Review of the*

Principal Questions in Morals. His works *Dissertations on Providence and Junction of Virtuous Men in a Future State* attracted the attention of Lord Shelburne in 1769 and led to a lifelong friendship, Shelburne when he became premier in 1782 making Price his secretary. In 1771 Price wrote *An Appeal to the Public on the Subject of the National Debt*, from which Pitt probably derived his idea of a sinking fund. He had previously attracted attention by papers on actuarial and statistical questions. Price, however, made his name still more widely known by his pamphlets directed against the war with America, and in 1778 he was invited to become a citizen of the United States. He sympathised with the French Revolution, and his sermon *On the Love of our Country* (preached at the Meeting-House in Old Jewry on November 4th, 1789) is said to have been the red rag that drew Edmund Burke. From the University of Glasgow Price received the degree of D.D. in 1769 and from Yale College that of LL.D. in 1783. He died in London on April 19th, 1791, and was buried in Bunhill Fields.

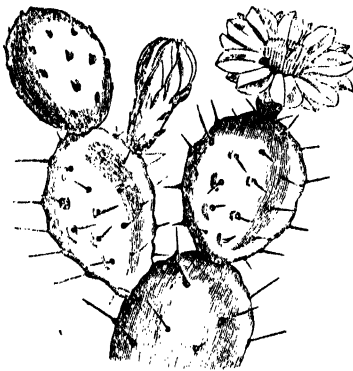
Prichard, JAMES COWLES, physician and anthropologist, was born on February 11th, 1786, at Ross, in Herefordshire, and was first educated at home, where he learned French, Italian and Spanish. When his parents, who belonged to the Society of Friends, removed to Bristol he found opportunities of increasing his knowledge of foreign tongues. He studied medicine there and, later, at St. Thomas's Hospital, London, and in Edinburgh, where he graduated in 1808, taking *De Humani Generis Varietate* as the subject of his thesis. After residence at Cambridge and Oxford he began to practise in Bristol. Making a profound study of ethnology, in 1813 he published his *Researches as to the Physical History of Man*, wherein he maintained that the colour of the negro's skin was not due to the sun's action; white skin, he held, resulting from the influences of civilisation. While immersed in increasing professional work he issued *An Analysis of Egyptian Mythology*, 1819, which led to his friendship with the Chevalier Bunsen. In 1822 his *Treatise on Diseases of the Nervous System* appeared, the result of his observations among the mentally afflicted. His later *Treatise on Insanity*, 1835, was for many years the standard work on the subject. In it he claimed to have first described "moral insanity": that there are persons truly irresponsible without the intellectual disorder which would be legally recognised, a position now accepted by scientists. In his *Natural History of Man*, 1843, he states "we are entitled to draw confidently the conclusion that all human races are of one species and one family," a position he re-asserted in his address before the Ethnological Society in 1847. "The further we explore the various paths of inquiry," he said, "the greater the probability . . . that all mankind are descended from one family." Regarding philology as necessary to the student of ethnology, which he raised to the rank of a science, he studied Sanskrit, Arabic and other languages and produced his *Eastern Origin of the Celtic Nations*. He was made a Commissioner in Lunacy in 1845; was President of the Ethnological Society, and his

eminence was acknowledged by several distinguished bodies. He died in London on December 23rd, 1848.

Prickly Heat, a papular skin eruption, attended by burning heat and an almost intolerable prickly itching. It commonly occurs in tropical lands, and visitors, being unused to extreme heat, are more susceptible to attack than natives. There is profuse sweating. Little if anything can be done by way of treatment, but the rash generally subsides in a week or so.

Prickly Pear, the popular name of the genus *Opuntia*, cactuses, numbering over 150 species, native to hot, dry regions in the New World from California to Chile. They mostly have jointed, flattened, fleshy stems with minute deciduous leaves, in the axils of which the tufts of spines and the flowers arise. The latter are usually yellow or orange,

with indefinite sepals and petals graduating into one another, numerous free included stamens, a single style and five to seven stigmatic lobes. The fruits are inferior berries, pear-shaped and bearing tufts of small spines. These plants have become naturalised in Southern Europe, North Africa and the Canaries. They are much used for hedges and in Mexico for rearing the cochineal insect. Their sweet fruits are refreshingly cool and sugar is extracted from them.



PRICKLY PEAR.

Pride, THOMAS, colonel in the Parliamentary army, was a native of London (though Ashcott, near Glastonbury, and Haverfordwest have also been named as his birthplace), but the year of his birth is not known. At the battle of Preston, in August, 1648, he first distinguished himself; but he is chiefly known in history as having been entrusted with the "purging" of the House of Commons from the Presbyterian element, which in December, 1648, wished to conclude a treaty with Charles I. He was one of the regicides and a member of Cromwell's Upper House, and died at Nonesuch Park in Surrey (of which county he was high sheriff in 1655-6) on October 23rd, 1658. His body escaped the posthumous indignities barbarously offered to those of Cromwell, Ireton and Bradshaw.

Prideaux, HUMPHREY, scholar and divine, was born at Padstow, Cornwall, England, on May 3rd, 1648, and was educated at Liskard and

Bodmin Grammar Schools, Westminster (under Dr. Busby) and Christ Church, Oxford. He was distinguished at the university for scholarship and was appointed Busby's Hebrew lecturer at Christ Church in 1679. After having held various benefices in different parts of England, he was in 1681 named Canon and in 1702 Dean of Norwich, having been also Archdeacon of Suffolk (1688). His reputation rests on his *Life of Mahomet* (1697) and *The Old and New Testament Connected in the History of the Jews* (1716-18), of both of which the story goes that the publisher to whom they were submitted remarked that "he could wish there were a little more humour in it." Prideaux died at Norwich on November 1st, 1724.

Priest, in its largest meaning, applies to all persons who conduct the worship of a god or gods by means of certain fixed ceremonies, among which sacrifice has always been regarded as the most important. The word is derived through French and Latin from the Greek *presbuteros*, "elder" [PRESBYTERIANS]; but, owing to the pre-Christian associations which had early gathered round it, it is never used to translate *presbuteros* in the New Testament. In the Authorised Version "priest" translates the Hebrew *kohen* (Septuagint, *hierens*: Vulgate, *sacerdos*) and rightly so, for in both the Greek and Latin churches the functions of the *presbuteros* came to be identified, or at least closely assimilated in idea, with those of the ministers of the ancient Jewish religion. The transition to those who held a like position in the great heathen religions of antiquity was then natural and easy. In the Christian religion the identification of the *presbuteros* and the *hierens*—the notion that the priest is a mediator between God and man—was in large measure due to the conception of the Eucharist as a propitiatory offering. The religious movement which culminated in the Reformation was a protest against the sacramental character of the priesthood and there is now no point concerning which there is greater divergence of view between the Roman and Reformed churches, or even between members of the same communion in the Reformed churches, than the nature of the priestly office. The Church of England in her "office of institution" ascribes sacerdotal functions to the priesthood—namely, the offering of sacrifice, praise, and thanksgiving in the Eucharist, "the declaring and pronouncing the absolution and remission of sins" and the blessing of the people in God's name.

Priestley, JOSEPH, theologian and man of science, was born at Fieldhead, in the West Riding of Yorkshire, on March 13th, 1733. He received a very promiscuous education, showing exceptional facility in languages. He was entered at Daventry Academy in 1751 with a view to becoming a minister, although his opinions were already straining at strict orthodoxy. He was, he said, "distressed" because he could not "feel a proper repentance for the sin of Adam." He was appointed to Dissenting charges at Needham Market and Nantwich and was also for some time classical tutor at Warrington Nonconformist Academy.

While here he was created LL.D. of Edinburgh (1764), and in 1766, in consequence of his electrical researches, was elected to the Royal Society of London. In 1767 he published his *History of Electricity* and in the same year was called to Mill Hill Chapel in Leeds, in which town he founded the circulating library in 1770. He resigned the chapel in 1772 to become librarian and tutor to Lord Shelburne's sons, but the connection was dissolved amicably in 1780, when it grew apparent that Priestley's *Disquisitions on Matter* (1777) and increasing materialism were antipathetic to his lordship. He removed in 1780 to Birmingham, where the generous gifts of friends (amongst them Josiah Wedgwood) provided the instruments needed for scientific research and where he again undertook ministerial duties. In 1782 appeared the *History of the Corruptions of Christianity*, the best-known of his theological works, which was burned at Dordrecht in 1785 by the common hangman. In 1786 was published his *History of Early Opinions concerning Jesus Christ* and in the same year he began the issue of his annual defence of Unitarianism. He was one of the founders of the Unitarian Society in 1791. In this year he was obliged to leave Birmingham after his chapel had been destroyed by a mob who disapproved of his sympathies with the French Revolution and would have killed him with pleasure; and, after living three years at Hackney, he sailed to the United States, making his home at Northumberland in Pennsylvania, where he died on February 6th, 1804. Priestley's chief claim to remembrance is his discovery of oxygen (August 1st, 1774), which he called "dephlogisticated air."

Prim, JUAN, general and statesman, was born at Reus, in Catalonia, Spain, on December 6th, 1814. He distinguished himself in the first Carlist war as a supporter of the Regent Christina, and when peace was made became the leading opponent of Espartero, whom in 1843 he drove from the capital. He was then appointed governor of Madrid with the title of Count of Reus, but was displaced and imprisoned by Narvaez. After his achievements in Morocco (1859-60) he was created Marquis de los Castillejos. In 1868, having assisted in the overthrow of Isabella, he became Minister of War. He procured the election of the Duke of Aosta to the Spanish throne, but was shortly afterwards assassinated by the Carlists on December 27th, 1870.

Primary Rocks, a term formerly applied in geology either to the plutonic igneous rocks, such as granite, under the belief that they were the first rocks to form on the cooling of the earth from its primitively molten condition, or to the Palæozoic rocks, as opposed to the Secondary and Tertiary. Being thus hopelessly ambiguous, it is now generally disused.

Primates, the first order of Mammals, containing Man, the Anthropoid Apes, Monkeys, and Lemurs. Linnaeus (1735) included the Bats, which now form a separate order (*Chiroptera*).

Prime Number is a number which is not divisible by any number except itself and unity: 1, 2, 3, 5, 7, 11 are examples of such numbers, to which there is no limit. Two numbers are often said to be prime to each other when they have no common factor except 1.

Primitive Methodists. When the members of the New Connexion left the Methodists an energetic attempt was made to gain recruits for the parent body by means of revival services. Lawrence Dow, an American, who had been a preacher in the United States and in Ireland, started camp-meetings in 1807 at Mole Cop, near Newcastle, Staffordshire, being assisted by Hugh Bourne and William Clowes. They advocated a return to the open-air preaching by which John Wesley obtained his first converts sixty years before. But Methodism had attained a position of dignity and the Conference of 1807 decided that, supposing such meetings were allowable in the United States, they were both mischievous and improper in England, and it disclaimed connection with them. Other points of difference arose, especially as to whether women should be allowed to preach. Bourne and Clowes were expelled. They at once formed another sect and were soon joined by sixteen congregations and twenty-eight preachers in Lancashire, Yorkshire and Cheshire. Thus the Primitive Methodist Connexion, called by their opponents the Ranters, arose. Camp-meetings became infrequent, since, with a steadily-growing membership, chapels were needed, and of the several offshoots of Methodism they have become the most numerous body.

Primogeniture, the principle by which the real estate falls to the eldest son, to the exclusion of the younger sons and daughters. To all intents and purposes it is limited to the United Kingdom, having been abolished (save as regards succession to the Crown) on the Continent and being wholly repugnant to the public sentiment of the United States. It has held its ground in Great Britain, because in actual practice it keeps large properties together. It is, however, essentially a feudal institution, although in parts of Kent and elsewhere in England there were customary exceptions to the operation of the legal principle.

Primrose, a corruption of *primærole*, the abbreviation of the French *primeverole*, the Italian *primaverola*, a diminutive of *prima vera*, the "first spring flower," a name applied formerly to the privet but now referring to *Primula vulgaris*. This plant has a truncate or premorse rhizome; a rosette of wrinkled obovate leaves with netted venation prominent beneath; a very short peduncle with an involucre of linear bracts; long, pink-tinged, hairy pedicels; a slightly inflated, five-angled tubular calyx; a spreading, salver-shaped, generally pale yellow corolla, with notched petals and an orange centre with thickened folds. This ordinary form with shortened peduncle is termed *P. acaulis*, that with it elongated, *P. caulescens*. The flowers exhibit dimorphic heterostyly, giving rise to the variations popularly called "thrum-eye"

and "pin-eye" and also vary greatly in colour, white and red being the chief exceptional tints. Akin to it are the Cowslip, the origin of the garden *Polyanthus*, and the Oxlip. Early blossoms often open at Christmas, or even sooner.



PRIMROSE.

Primrose League,

a Conservative organisation founded on November 17th, 1883, largely through the instrumentality of Lord Randolph Churchill, Sir John Gorst, Sir Henry Drummond-Wolff and Sir Alfred Slade, in memory of the Earl of Beaconsfield. Its objects are to promote the political principles of the Tory party and actively to assist the candidature of aspirants for Parliamentary honours who will maintain these principles. It is divided into habitations and its members are known as knights, ladies and associates. Its motto is "Imperium et Potestas," its seal three primroses and its badge a monogram of the letters P.L. surrounded by primroses. It took its name from the impression that the primrose was Lord Beaconsfield's favourite flower, a notion that arose from the following legend in Queen Victoria's handwriting that accompanied a wreath of primroses gathered in the Isle of Wight which was placed on the earl's coffin—"His favourite flowers, from Osborne: a tribute of affectionate regard from Queen Victoria." It afterwards appeared, however, that the gardenia was the deceased statesman's favourite flower and that the Queen was probably thinking of the Prince Consort's preference when she wrote "His favourite flowers."

Primula, the typical genus of the gamopetalous order Primulaceæ, comprising about fifty perennial herbaceous species. They have umbellate inflorescences; radical leaves; regular five-lobed calyces and corollas, five included epipetalous stamens opposite the corolla-lobes; a capitate stigma; simple style; one-chambered ovary, with many-ovuled free central placenta; and a capsule splitting above into ten teeth. A few species occur in North America. *P. japonica* (with many-tiered umbels), *P. sinensis* of China, the cowslip-like *P. sikkimensis* of the Himalaya, the auricula (*P. auricula*), primrose, cowslip, and oxlip are familiar forms.

Prince. The origin of this title is frequently assigned to the denomination of *princeps senatus*, applied to the most respected member of the Roman Senate and afterwards, it is said, adopted by Augustus. The view now accepted, however, is that the title adopted by Augustus was that of *princeps* simply, in the sense of "foremost citizen."

With the growth of Imperial power the term *princeps* came to imply sovereignty or dominion. Unlike "king" and "monarch," it is applied to dependent as well as supreme rulers and even to persons of royal or noble blood who exercise no authority at all. In the United Kingdom its use is confined to those who are closely related to the reigning sovereign. The heir apparent bears the title of Prince of Wales and his brothers are generally known by the dukedoms conferred upon them after the attainment of their majority, the dukedom of York being commonly conferred on the second son of the sovereign. In Russia the Tsar's eldest son is Tsarevich, the princes are Grand Dukes. In Austria the princes are Archdukes. In Spain a prince is Infante, a princess Infanta. The eldest son of the King of Greece is Duke of Sparta, of the King of Belgium Duke of Brabant. The epithet Princess Royal for the eldest daughter of the ruling monarch was introduced into Great Britain from Prussia by George II., and it was not until the time of Charles I. that the daughters of British sovereigns were styled princesses. The daughters of Henry VIII., for example, were the Lady Mary and the Lady Elizabeth. In France under the *ancien régime* the king's eldest son was Dauphin and his eldest brother Monsieur. Napoleon created several princes who were not of blood royal at all and in Germany this practice has been followed, as in the case of Bismarck. In Russia the title appears to abound because it is the translation of the chief title of nobility (*Knyaz*).

Prince Edward Island, a province of Canada, lying off the south shore of the Gulf of St. Lawrence and separated from Nova Scotia on the S. and New Brunswick on the W. by Northumberland Strait. About 150 miles long by 34 miles broad, it has an area of 2,184 square miles, the surface being undulating with no elevations higher than 500 feet. It has a fertile soil and a mild climate, so that heavy crops of wheat, oats and other cereals, with fruits, potatoes, turnips, pease and beans, are raised; but the chief industry consists in the fisheries, lobsters being a speciality. There are no minerals of commercial value, though coal is known to exist. The industries include shipbuilding, meat-packing, the making of boots and shoes, tobacco manufactures, and every branch of dairying. The chief towns are Charlottetown, the capital (12,080), Summerside (2,875), and Georgetown (1,060). The province is governed by a Legislative Assembly and is represented in the Dominion Parliament. Cardigan Bay to the E., Richmond Bay to the N., Hillsborough Bay to the S., and Egmont Bay to the S.W., divide the island into three peninsulas linked by isthmuses of no more than three or four miles broad. Until 1758 it was nominally French and was known as the Isle St. Jean, the title being changed in 1799, out of compliment to the Duke of Kent who visited the island in that year. The British captured it in 1763, when it was placed under the jurisdiction of Nova Scotia, but five years later was erected into a separate province. It was admitted into the Dominion of Canada in 1873. Pop. (1901), 103,259.

Prince of Peace, the name given to the Spanish statesman Manuel de Godoy, Duke of Alcudia (1767-1851). He received the title on account of his share in the Treaty of Basel (1795). At the critical juncture in the affairs of the Peninsula he entered into an alliance with Napoleon, with a view to the spoliation of Portugal, discovering when too late that his policy had been mistaken and then endeavouring to establish friendly relations with Great Britain. On the abdication of Charles IV. he was so unpopular that he narrowly escaped death.

Princeton, a town of New Jersey, United States, 49 miles S.W. of New York. It is the seat of Princeton or New Jersey College, founded in 1746 at Elizabethtown and removed hither in 1756. Among the principal collegiate buildings are Nassau, Alexander and Blair Halls, Marquand Chapel, the museums of art and geology and archaeology, and Halsted Observatory. The library comprises 250,000 volumes. Here, too, is the oldest Presbyterian Theological Seminary in the States, having been established in 1812. Washington defeated the British at this spot in 1777, and in Nassau Hall the first Continental Congress met in 1783 and Washington received the nation's thanks for his tenacity of purpose in guiding the Revolution to a successful issue. Pop. (1900), 3,899.

Principia, the name given to the chief street in the Roman *castra* or camp. It was 100 feet wide and ran in a direct line from the main gate on the right to that on the left. The side streets were 50 feet wide. The word "Principia," however, is most commonly associated with Sir Isaac Newton, being the contracted title of his *Philosophiæ Naturalis Principia Mathematica*, published in 1687. Newton's use of the word brought it into vogue in connection with elementary textbooks, as *Principia Latina* and so on.

Printing, as the etymology of the Latin word *premo, pressum*, "to press," implies, literally means marking by pressing one thing upon another. Letterpress printing, therefore, is the art of imprinting characters or letters on paper, parchment and other materials by means of a press. The characters are in relief—as distinguished from intaglio, as in copperplate printing—and a pigment or ink is applied to the raised surface. Pressure causes this ink to be transferred to the material to be printed. In typography, which is the principal branch of letterpress printing, the surface inked consists of movable interchangeable types or of casts taken from them called stereotypes. The precursor of letterpress printing was engraving. In 1454 Letters of Indulgence were printed which embodied a fundamental alteration in the then method of printing. They were done from movable types cast in a mould. Two years later an entire Vulgate Bible—the Mazarin Bible, so-called from the library in which the most notable specimen was discovered—was printed from movable type. The oldest type-printing with an authentic date printed in is the Psalter of Fust and Schoeffer, dated 1457. An interminable controversy has

been carried on for several hundred years as to the actual inventor of printing by movable type, but no definite result has been arrived at. The first printers seem to have regarded their art merely as a means of cheapening books which were previously written; and they did not, apparently, anticipate the tremendous results which have been the outcome of the popularisation of literature by means of the printing press. Historians differ chiefly as to whether Laurens Coster of Haarlem (1370-1440) or Johann Gutenberg of Mainz (1410-68), with the assistance of Johann Fust and Peter Schoeffer, is entitled to the honour of having first printed from types, though the evidence seems to make in favour of Gutenberg. The date of the invention, however, may be approximately fixed at the year 1450. The art spread with marvellous rapidity throughout Europe and the result was the production of many books of considerable beauty in regard to text and illustrations. It was brought to England in 1476 or 1477 by William Caxton. He adopted typography as a method for multiplying copies of his compositions. He was not a good printer, his style being much behind that of several contemporary Continental typographers. His books, apart from their literary merits, have little interest except that arising from their rarity. They are all in "black letter" or Gothic type, very similar to that of the first Bible above mentioned, the characters of which were copied from the manuscript service books of the period. Roman letter, in which English books and newspapers are now almost exclusively printed, is copied from the writing of the Italian scribes of the 15th century, which was famous for its beauty. It did not make its appearance in England until 1518, when Richard Pynson printed a book in it, the type being probably obtained from abroad. From 1477 to the early part of the 16th century printing spread to different towns in Great Britain, and books were produced in large numbers, the demand for them, at first extremely limited owing to the paucity of readers, increasing with remarkable rapidity as education became extended. In 1530 books and tracts had grown so numerous that they were regarded as a possible danger to the state and society and a form of censorship was established. The press was in that year first licensed and a period of decadence set in which lasted for more than 150 years. Subjected to restriction and repression, the art decayed. There was little competition between printers, many of whom enjoyed privileges and monopolies; old and bad type was used and excellence of typography quite disregarded. In 1695, by the abolition of the licensing system, the press became emancipated and an era of revival set in. Its results may be seen in almost every book printed during the early part of the 18th century. There arose a demand for good types and clear impressions. For many years the best types had to be brought from the Continent, as the art of letterfounding had suffered in conjunction with that of printing. The demand was followed, as usual, by the supply and William Caslon the elder (1692-1766) produced founts which for beauty and finish were not surpassed in Europe. Great printers, like

the two Bowers, Watts, and John Baskerville, educated the reading public in the points of technique which constitute typographical excellence and ultimately there raged a "bibliomania" for costly and sumptuous books which stimulated not only the art of printing but the whole of its auxiliary arts, including paper-making and book-binding. This was succeeded by the period of revolution and development which began with the invention of the steam press, first used for printing *The Times* in 1814. Books and periodicals, published at popular prices, attained enormous circulations. This enabled publishers to spend previously unheard-of sums of money upon their production. Issues such as those of the house from which this volume emanates would have been regarded as merely visionary before the invention of the steam press and, if called for, the demand could not have been met. The steam press also rendered possible many improvements which could not have been made when there was in use only the old hand-press—notably the printing of large woodcuts. All the accessories of typography in the way of methods of illustration and ornamentation have since been cultivated with an ever-increasing assiduity and success. Not only so, but entirely new arts have been originated, such as stereotyping, electrotyping and photo-process engraving. The printing trade has, unlike other trades, not suffered by the general introduction of machinery; the art has been brought to a state of perfection which the old printers would find it impossible to realise. The best books of to-day are, notwithstanding much current criticism and detraction, in their style and attributes greatly superior to those of any previous age. Indeed, such a work as the *Kelmscott Chaucer*, issued in 1896 from the printing-press established by William Morris, the poet and designer, is in advance of anything which the great master-printers of the past ever produced. Morris, with the expert counsel of Emery Walker, designed his own types and placed the Kelmscott Press in the front rank of the world's printers.

Amongst the best books for general readers on the origin and early history of printing are:—*Early Printed Books*, by E. Gordon Duff (London, 1893); *Early Illustrated Books: a History of the Decoration and Illustration of Books in the 15th and 16th Centuries*, by Alfred W. Pollard (1893); *Invention of Printing*, by Theodore L. De Vinne (1876); *History of the Old English Letter-founders, with Notes on the Rise and Progress of English Typography*, by Talbot B. Reed (1887); *Biography and Typography of William Caxton*, by William Blades (1882); *Pentateuch of Printing*, by William Blades (1891).

Of the many processes which together constitute the practical art of letterpress printing, it will suffice if we confine ourselves to a sketch of the manner in which a book like the present is produced. This page is printed from a surface composed of types, each representing a single letter (with the exception of such "ligatures" as *ff*, *fl*, etc.), or a punctuational point, or a reference mark, together with the spaces that divide the words and

paragraphs—to the number of more than 6,000 separate pieces or "stamps." The whole of the characters of any one "sort" have been cast from one matrix. When this and other pages are printed off—we designedly overlook stereotyping—the types of which they are composed are decomposed or "distributed," and are available for being again composed to form other pages. In this capability consists the essence of typography—the interchangeability and possibilities of endless combinations of the separate types. The size of type used for this page is called *brevier*; by measurement it will be found that 111 lines would go to the foot. Larger types are those known as *bourgeois* (102 to the foot), *long primer* (90), *small pica* (83), *pica* (72). Smaller types are *minion* (122), *nonpareil* (144), *ruby* (166), *pearl* (180), *diamond* (207). Much larger types are manufactured, but those named are chiefly what are used in printing books and newspapers. The size of type, it should be mentioned, cannot invariably be ascertained by measurement, as there may be spaces between the lines of type, which would then be called "lead"; otherwise, as in the present instance, it is said to be "set solid." The width of each of these columns is $2\frac{1}{2}$ inches; printers would call it "15 ems pica." The "em" is the square of pica body and is the unit of typographical measurement; as 6 picas go to the inch, $2\frac{1}{2}$ inches, of course, are equal to 15 picas. One-half of the width of the "em" is the "en," which is regarded as the average width of the various letters of the alphabet. Hence we have a ready method of ascertaining the contents or number of letters in a given superficies of printed matter. Each of these columns is 23 ems *brevier*, or 46 ems *brevier*, in width. There are 66 lines in the column. Accordingly 46×66 gives, approximately, 3,036 as the number of letters and spaces in a column.

The method of manufacturing types is briefly described *s.r.* TYPEFOUNDING. When a complete assortment of type, called a *fount*, is received, the printer distributes each sort into the compartments (or "boxes") of shallow trays (or "cases"). The capitals and small capitals go into an "upper" case—so named on account of its position on the sloping desk-like stand (or "frame"). The other letters are kept in the "lower case" and are so designated. In writing "copy" for printers the intention of an author to have a capital is intimated by the drawing of three, of a small capital of two lines, underneath the letter or word. Italic letters are kept in separate cases and are indicated in manuscript by one line beneath. The compositor, or type-setter, having his copy before him, holds in his left hand an instrument, the "composing stick," into which he places the types as they are taken one by one from the boxes, with the thumb and first finger of the right hand. The "stick" has an adjustable slide, whereby the width of the line (the "measure") is regulated. Each letter is picked up separately and steadied in its position in the stick by the thumb of the left hand. With the view of expediting composition, a number of letters forming a word or an affix or prefix have been cast in one piece, called a "logotype," but

this system has not been found to answer the purpose. Between the words are placed "spaces," which are shaped like types but are shorter and thus escape inking and consequently do not show up on the printed page. The spaces are (besides the hair space, used chiefly in ornamental composition) the thin, of which 5 are equal to one em, the middle (4 = one em), and the thick (3 = one em). Of the same nature as spaces are quadrats or "quads," the larger kinds of which are used mainly to blank out the ends of paragraphs. The en quadrat is half of the em, which, as already mentioned, is the square of the body. Each of the paragraphs in this page is "indented" with an em-quad.

Before completing the line, the compositor notices whether an entire word can be "got in" or whether it is necessary to divide it, placing a hyphen after the portion dis severed. It may be possible to get in the word complete by using thinner spaces; or, to make the line the right length, thicker or extra spaces may be used. It is imperative that the line be precisely "full" and the operation is called "justifying." The next and succeeding lines are set in a similar manner, until the stick, which may hold about a dozen lines of brevier, is quite full. It is then "emptied" by grasping the matter between the extended second finger and thumb of each hand and the matter is placed on a shallow tray, with upright flanges to support the letters, called a "galley." A "proof" of this—a sample impression—is then printed or "pulled" and compared with the copy by the "reader," otherwise the corrector of the press. The copy will probably be read aloud to him by the reading boy. The proof, as corrected, goes back to the compositor, who makes the rectifications marked by the reader. Another proof is pulled, called a "revise," and is compared with the first proof. If the composition is sufficiently accurate a "clean" proof is pulled for the use of the author. It reaches him in the shape of a long "slip," comprising about two of these columns, but often longer. The author having read and corrected the proof, returns it to the printer and any directions contained in it are attended to. Errors of workmanship in first proofs are corrected by the compositor at his own expense; alterations from copy made at the instance of the author are chargeable to him as "author's corrections." When satisfied with the matter, the author writes on it "Press" and initials the proof to signify that it may be printed off.

The type is now to be made up into pages on a wider galley. The lines at the head and between the columns are made by strips of brass called "rules," the white spaces between them and the types by leads. The head-line and the folio are put in and the page, duly gauged for accuracy, is tied up with string and then slid off upon an "imposing stone," really a large table bearing a smoothly-planed plate of iron. Here the pages are made up into "sheets." This book consists of sheets of sixteen pages. These are "imposed" together, that is, they are so arranged that they will when the paper is printed and folded read consecutively. Imposing for different-sized sheets requires much experience on the part of the com-

positor. Between the pages, corresponding to the margin of the printed sheets, pieces of metal or wood, called "furniture," are placed. The strings being now removed, an iron frame, called a "chase," is chosen of the required dimensions. The type is "locked up" in the chase, or fastened up tightly by means of wedges called "quoins" acting against tapering pieces of wood called "side and footsticks." Type and furniture, as it stands in the chase, is called a forme or form. After being levelled or "planed down," it is ready to go to the machine room, unless it has to be stereotyped, in which case the type is not printed from.

The processes already mentioned belong to the department of printing called "case-work"; now we come to "press-work." The hand-press consists of two essential parts—an iron bed on which the flat forme of type is placed and a platen, a flat plate of iron. The forme, on which is the paper, is pressed between the two by levers and links. Hinged to the bed is the tympan, which is a double iron frame on which parchment is stretched. Between the inner and outer parchments blanketing or paper is placed to prevent the platen from injuring the type and for other reasons. The forme is inked by means of "rollers"—cylinders three or four inches in diameter made of a composition of glue, treacle, glycerine, or other materials. Printing ink is a mixture of lamp-black, oil and varnish and is of a treacly consistency. The sheet of paper is placed on the tympan, which is folded over on the forme, the bed and carriage run in under the platen, which is brought down by the "handle," a long lever acting upon an ingeniously-contrived system of levers. The carriage is then run out, the sheet removed and the process repeated with other sheets. Two men, one "rolling" and the other pulling the handle, thus print about 250 sheets of paper, on one side only, per hour. Machines or mechanical presses greatly increase this production by performing some of the operations automatically. Machines are of many designs, but in principle nearly all come within two categories. In the first the impression is given by a revolving cylinder geared to the flat bed for the forme, which travels backward and forward underneath the cylinder. In the second, the types (in reality, curved casts from them) are fixed on the periphery of the cylinder. Both the type cylinder and the impressing cylinder rotate—hence the machine is called a "rotary" one—and during the movement the paper is printed. In both the cylinder and the rotary machine the inking is done by rollers revolving as parts of the general arrangement. The cylinder machine prints only one side of the paper, at a speed of about 1,000 per hour. A double-cylinder machine, however, prints both sides, or "perfects" the sheet, before it is removed, by bringing it successively into contact with the two formes, which are at the two ends of the machine. In both, single sheets are fed in by hand. In the rotary machine a reel or web of paper is used, which is wound on a spindle at one end. The paper is brought in contact with cylinders bearing the two formes and is consequently printed on both sides. This is the most improved method for newspapers, which are, after being printed, cut off

from the reel and folded automatically. A sheet of *The Times* can thus be printed at the rate of about 24,000 per hour; or, if a double-width reel is used, at the astounding rate of 48,000 per hour. A supplement may be simultaneously printed, insetted and the whole paper pasted down the back. In a large number of instances, too, web-printing rotary machines are used on which by one and the same operation a wrapper is printed (on a different-coloured paper) with the text; the latter is insetted into the wrapper and the magazine is stitched and delivered complete at a high rate of speed. Mention, too, must be made of the very rapid strides made in recent years of what is known as the "three-colour process." The great success obtained by the co-operation of the process-block makers with the fine-art letterpress printers in producing colour-work of all descriptions by the combination of the three primary colours is remarkable and has dealt a severe blow to the more expensive methods of colour-printing by lithography, though for work in which scrupulous accuracy in minute detail and finish are essential and expense is not a consideration, chromolithography is really indispensable.

The operations of the composing-room have been greatly expedited by the introduction of composing machines. These are of various kinds; perhaps the best-known is the Linotype machine. As its name implies, it sets up a complete and solid line of type—called a slug—at one operation. These machines are extensively used for newspaper work. The Monotype is also largely employed; it is more adapted to bookwork, and by two operations—a keyboard and a casting machine are used—it produces work properly set up in "movable" or separate types. Among other machines which may be mentioned are the Empire and the Fraser composing machines. These require the type to be already made and specially "nicked" for them and they have also "distributors" as a part of their equipment. The introduction of a large quantity of "fancy" type from the United States brought into prominence the question of the "point" system, in which there is a uniform difference between every size of type and it is probable that this will be adopted by British printers.

Prior, MATTHEW, poet and diplomatist, was born on July 21st, 1664, probably at Wimborne Minster in Dorsetshire, England, though the exact place is unknown. He was educated under Dr. Busby at Westminster School and became scholar of St. John's College, Cambridge, where, with his friend Charles Montagu, he wrote *The Story of the Country Mouse and the City Mouse* (1687), a parody of John Dryden's *Hind and Panther*. Some time after leaving Cambridge he obtained the post of secretary to the British ambassador at The Hague. In 1697 he brought over to England the Treaty of Ryswick and in the following year was transferred to the Paris embassy. He became a Commissioner of Trade in 1700 and sat in the House of Commons for a few months in 1701 as M.P. for East Grinstead. Hitherto a Whig, on the accession of Anne he joined the Tories, who gave him

(1711) a Commissionership of Customs to make up for the Commissionership of Trade of which he had been deprived in 1707. For his share in the Peace of Utrecht he was impeached (1715) by the Whigs and imprisoned and spent the rest of his days in retirement. He died at Down Hall, near Harlow, in Essex, an estate which Lord Harley had placed at his disposal, on September 18th, 1721, and was buried in Poets' Corner, Westminster Abbey. Prior owes his reputation to his poems, collected editions of which were published in 1709 and 1718. *Alma, or the Progress of the Mind*, is a long poem in imitation of the author of *Hudibras*; but it is in his occasional verse, short lyrics and epigrams in the manner of Ovid and Horace, that he chiefly shines.

Priory, a religious house ranking next to an abbey and often dependent upon it. Its superior is called a prior or prioress. Before the 13th century the head seems to have been styled provost or prelate, prior meaning any superior or senior. The superiors of the houses of Regular Canons were called Priors and the Commandants of the Military Orders of St. John of Jerusalem, of Malta and of the Templar Knights were known as Grand Priors. A claustral prior was a superior who acted in an abbey as Assistant of the Abbot, while a conventual prior was an alternative designation of the prior as superior of his own priory.

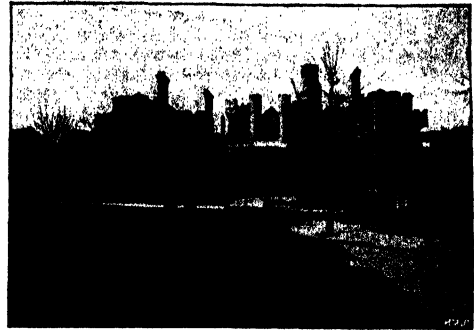
Priscian (PRISCIANUS CÆSARIENSIS), the Latin grammarian, flourished in the 6th century. His chief work was his *Institutiones Grammaticæ*, a learned treatise in eighteen books, which remained a standard work throughout the Middle Ages. His Grammar is valuable to moderns in a special sense, since it preserves—by way of examples and illustrations—extracts from authors whose works, but for these fragments, would be lost to us. Of the universal use formerly made of the Grammar interesting evidence exists in the thousand MSS. of it still surviving. He also wrote two poems in hexameters.

Priscillian, the founder of a Gnostic heresy, was a Spaniard of noble birth and flourished in the 4th century. Some time after his ordination as Bishop of Avila he began to be suspected of heretical views and at the Synod of Saragossa in 380 he was excommunicated. He and his three chief followers appealed in vain to the Pope at Rome; but the sect continued to teach for a few years till it was condemned by the Synod of Bordeaux in 384. Priscillian appealed to the Emperor Maximus, with the sensational result that he became the first victim of the Theodosian law against heretics, being executed at Trèves, along with six companions, in 385. The sect made a special study of occult science and abstruse problems in philosophy, taught the theory of emanations, the pre-existence of souls, the eternity of the Devil and the sinfulness of the flesh. It maintained its connection with the Catholic Church, but was accused by its enemies of practising magic and immorality. By the middle of the 6th century it had apparently become extinct.

Prism. a solid whose ends are any equal and parallel plane figures and whose sides are parallelograms. When its ends are triangles (and this is the most usual form of prism), it is extensively used in practical optics for producing refraction and dispersion and may be conveniently used for finding the refractive index of a substance. An "erecting" prism is frequently used when pictures of experiments done in a lantern are thrown upon a screen. The object-glass would cause the top of the apparatus to appear at the bottom of the screen; and, to avoid this somewhat confusing effect, a carefully-polished prism (of definite angular form) is placed in front of the object-glass.

Prisons. Incarceration, whether regarded as a reformatory or merely as a punitive process, is not a very ancient method of dealing with crime. In ancient Athens and Rome it was resorted to rather as a means of securing the persons of those who awaited trial or were doomed to execution than as an end in itself. At Athens persons who owed money to the State, or were unable to pay fines, could be placed in prison until the obligation was discharged. These continued to be the main uses of prisons up to a very recent period; their usual occupants were debtors or others whom it was necessary to detain for some ulterior purpose. In England, as in other countries, the condition of prisons (owing to the neglect and mismanagement of the State) became a grave social evil, which went on increasing till it excited the reforming energy of John Howard. They were always overcrowded, for gaol deliveries did not take place at fixed intervals, and a criminal's family were often allowed to reside with him in the prison. When Howard made his first journey through England, in 1773, he found that most of the gaols were loathsome underground dens, in which the prisoners were kept in a half-starved and almost naked condition, with nothing to lie upon but filthy and rotten straw. No distinction of sex was observed and the inmates were completely at the mercy of the gaolers, who extorted enormous fees for the most trivial concessions. The most ordinary sanitary precautions were neglected and no attempt was made to check the vice and debauchery which naturally thrived amid such surroundings. The value of Howard's labours was recognised by Parliament, but it was long before any effective steps were taken in the direction of remedy. At this time the commonest form of punishment was death, which might be incurred by petty larceny no less than murder. The only other penalty for grave offences was transportation, which originated in the Vagrancy Act of 1597. After the establishment of American independence it became necessary to devise some new method of punishing criminals, unless the death penalty were to be still further extended. An Act was therefore passed substituting hard labour at home (1776) and two years later the Penitentiaries Act, which was partly the work of Howard, provided the means of giving effect to the preceding statute. In this Act all the principles now recognised in prison legislation—including solitary confinement, care for the health

of the prisoner and the attempt to effect his reformation—are very clearly enunciated. It was nearly 40 years, however, before any penitentiary of the kind suggested was actually completed. In the meantime the hulks established in 1778 (and not entirely discontinued till 1857) formed a very inadequate substitute. The discoveries of Captain Cook revived the idea of transportation and in 1788 the first batch of Australian convicts was landed at Port Jackson. The evils attending this method of punishment had already become manifest before Millbank Prison, in London—the site of which is now occupied by the Tate Gallery—was at last opened (1816) in accordance with the Act of 1778. Millbank was the first of a new



HOLLOWAY CASTLE.

class of prisons, the history of which it will be well to follow out before returning to those of the ordinary kind. The report of a parliamentary committee condemning transportation in 1838 and still more the growing repugnance of the Australian colonies to admit convicts, forced on the attention of the Government the urgent necessity of erecting penitentiaries at home. A system was accordingly devised by Sir George Grey, then Home Secretary, which (with some modifications) remains in force at the present time. William Crawford had recently returned from a mission to the United States, in which he had been much impressed by the salutary effects of the "Pennsylvanian System," which provided for the complete seclusion of each prisoner. The Government determined to adopt it, but this could only be done gradually, owing to the expense involved in erecting buildings containing so many separate cells. As absolute loneliness had frequently led to disastrous results in the United States, it was thought advisable that prisoners should not be entirely deprived of all human society.

In London Pentonville Prison, erected in accordance with the new plan under the superintendence of Sir Joshua Jebb, was opened in 1842. At Pentonville, Millbank and certain provincial prisons which suited the purpose, convicts passed through the first of the three stages assigned to them in Sir George Grey's scheme. Here during a period of nine months,

in which a strong effort was made to bring them under religious and moral influences, the convicts were engaged in some industrial occupation, with no society but that of the prison officials. In the second stage they were associated together in gangs and employed in the construction of public works. The first prisons erected for this purpose were Portland (1847), Dartmoor (1850), Portsmouth (1852) and Chatham (1856). The works thus constructed by convict labour include the breakwater at Portland and the fortifications and part of the dockyard at Chatham. It is impossible to avoid all intercourse between the men when they are at work, but pains are taken to minimise the amount of conversation. At all other times, both by day and night, the prisoners remain in complete seclusion. At the close of the second stage the convict received a ticket of leave, the condition annexed to his release being his removal to a British colony till the term of his sentence expired. It was supposed that during the first two stages his character would have undergone a change and that in a new country, amid unfamiliar surroundings, he would have a better opportunity of making a fresh start in life. The colonies, however, took a different view of the matter and the opposition raised, among others, by Tasmania and the Cape of Good Hope, necessitated the Penal Servitude Act of 1853. By this Act penal servitude took the place of transportation in all sentences under 14 years, the term to which the criminal was condemned being shortened so as to equal in amount the period he had previously passed in prison before receiving a ticket of leave. Thus a sentence to seven years' transportation became one to four years' penal servitude. Control over the released convicts by means of the ticket-of-leave system was, however, still maintained. The new arrangement did not commend itself to the country at large, mainly owing to the rapid increase in garrotting and similar crimes during the latter part of 1862. Although the connection between these crimes and short sentences and ticket of leave was never clearly made out, a parliamentary inquiry into the whole system was instituted in 1863, as a result of which an Act was passed again, making five years' the minimum term of a sentence of penal servitude (1864). The committee also expressed the opinion that convicts were too well treated and that a less liberal diet and harder work would tend to make the dread of penal servitude more effectual in preventing crime. At the same time, a stop was put to the practice of allowing prisoners large gratuities as a reward for diligence and good conduct. But it still remained the convict's interest to conduct himself well; for by the "mark system," which was now introduced, the period at which he passed from the second to the third stage was made to depend upon the number of marks earned by his industry and good behaviour. Transportation came to an end in 1867, when West Australia refused to receive any more convicts. The most important changes since that date have been the separation of confirmed criminals from the others (1878), the formation of the Star Class, consisting of convicts "not versed in crime" (1880), and the reintroduc-

tion of a term of penal servitude lasting three years (1891). Each convict prison is under the control of a separate governor, assisted by a staff of officials and clerks, together with a chaplain and medical officer, schoolmasters and a steward at the head of the store-keeping department. The governor is responsible to the Board of Directors (constituted in 1850), one or more of the members of which visit each prison at frequent intervals. A second visiting body, consisting of unpaid members, which acts independently of the other, was formed as a further safeguard in 1880. We may now return to the gaols reserved for "imprisonment," the term which is applied to sentences not exceeding two years. During the period which followed Howard's labours the laudable efforts of Parliament to introduce improvements formed a striking contrast with the actual condition of the prisons. Little or no attention was paid to statutes such as those directing a classification of the prisoners (1784) and requiring the appointment of a chaplain to every gaol (1814). The disgraceful state of Newgate—which, it may be interpolated, was demolished in 1904 to make room for the new Central Criminal Court—was disclosed by a parliamentary inquiry in 1814, but no alteration for the better was made during the ensuing years, excepting the marvellous change in the character of the female prisoners brought about by the labours of Elizabeth Fry. In 1818 there were 59 prisons in which no distinction was observed between the sexes. The labours of the Prison Discipline Society brought the state of the gaols more prominently before the notice of the country and of Parliament, and in 1823-4 Acts were passed laying down general regulations for the maintenance of health and making provision for the education and profitable employment of the prisoners. The Municipal Corporations Act (1835), by abolishing the anomalous privileges which enabled boroughs to evade these enactments, removed one of the chief obstacles to the reform of abuses and the introduction of a uniform system. Uniformity of treatment in regard to solitary confinement, diet and similar matters was recognised as the great end of legislation in the Acts of 1835 and 1839. By the former of these statutes prison inspectors came into existence and the latter gave rise to the office of surveyor-general of prisons, whose duty it is to see that the gaols built fulfil the requirements of health and discipline. After the return of the mission to the United States the advantages of solitary confinement had become generally recognised, and in the six years that followed the erection of Pentonville, 54 prisons were built on the same model in various parts of the United Kingdom. All previous statutes were embodied in the Prison Act of 1865, which entered into minute details on all points and exacted a penalty for every infringement of its regulations. Yet great diversity prevailed till the passing of the Act of 1877, by which the management of prisons was transferred from the local authorities to a body of commissioners appointed by the Home Secretary. These gaols are inspected by "visiting committees" elected by the magistrates each year in

quarter sessions. A criminal sentenced to "imprisonment" passes through four stages, the treatment in each stage being less severe than in that which precedes it. The rate of his progress from stage to stage depends on his industry and good conduct. "First-class hard labour," such as the treadmill, is exacted from him in the first stage, industrial labour in the others.

Privet (*Ligustrum vulgare*), a British shrub belonging to the olive tribe. It grows 8 or 10 feet high, with small, opposite, entire sub-evergreen leaves and panicles of white flowers, followed by black globular fruits (nuculanes). Both calyx and corolla are four-lobed and there are two stamens. The berries are used to colour port wine and to paint playing-cards. As a quick-growing shrub it is in great demand for garden hedges. The golden variety is extremely effective either as an isolated mass or as a hedge.

Privilege, a right, immunity, or benefit enjoyed by a person or persons beyond the common advantages of other persons. In the Roman Catholic Church privilege is an exemption granted by the Pope and differs from a dispensation or grace in that it does not apply to one specific matter but presupposes and makes legal (ecclesiastically) all acts done in pursuance of the original act and confers immunity in respect of every several act so privileged. Members of Parliament are entitled, in virtue of their office, to certain privileges as regards freedom of arrest and freedom of speech and other things, and a breach of privilege is constituted by disobedience of the orders or rules of the House of Commons, indignities passed upon its character and proceedings, assaults, insults and libels offered to its members, interference with the officials of the House in discharge of their duty. When Mr. Speaker Brand, of his own authority, on February 2nd, 1881, closed the debate on W. E. Forster's Coercion Bill and ultimately suspended the Irish members wholesale, his action was immediately met by cries of "Privilege" from the members affected. It was only justifiable (for its strict legality was more than doubtful) on the plea that necessity knows no laws.

Privileged Communication or **CONFIDENTIAL COMMUNICATION**, in law, a communication made in such circumstances that it is not a matter of right to prove it as an admission by calling the receiver of it as a witness.

Privy Council. The Royal or Privy Council originated in the Curia Regis, which during the Norman period exercised judicial, legislative and administrative functions. Its functions were afterwards differentiated, thus giving rise to the Courts of Exchequer, King's Bench and Common Pleas on the one hand, and the Royal Council on the other. The process by which the latter arose was, however, gradual. Thus in 1178 Henry II. referred difficult judicial or financial cases to a small circle of "sapientes" or councillors. A council of this description exercised large but vague powers during the minority of Henry III.

and, after maintaining its existence throughout his reign, became the Council of Regency during Edward I.'s absence in Palestine. The powers of the Council constantly increased, though not without occasional protests on the part of the Commons. The right of nominating the members acquired by Parliament under the Lancastrian kings is a constitutional landmark, since it was intended to put a check on the abuse of the royal prerogative. It was at this time that the name "Privy Council" came into use. In 1437 Henry VI. restored the nomination of members to the Crown and from the reign of his successor till the Puritan revolution the Council continued to be an instrument of arbitrary government in the hands of the sovereign. Even in judicial matters it was invested with extraordinary powers at variance with the common law and out of it grew arbitrary tribunals such as the Star Chamber and the Court of High Commission. Its judicial functions were curtailed by the Long Parliament (16 Car. I., c. 10) and, having become unmanageable through the large number of its members, it was superseded towards the close of the 17th century by an informal cabal, composed of "cabinet councillors." After the definite recognition of Cabinet government by William III., the Privy Council in its corporate capacity practically became obsolete. Regarded in that light it is merely a dignified body into which politicians of mark may be admitted, with the title of "Right Honourable," while they rank after Knights of the Garter and St. Patrick in the scale of general or social precedence. Use, however, is still made of the Council to facilitate the transaction of public business. The Board of Trade was at first one of its committees and the origin of the Local Government Board and the Board of Agriculture, to each of which duties previously discharged by the Council have been transferred, is virtually similar. From 1839 to 1899 the Board of Education was a committee of this kind, the Minister of Education being technically Vice-President of a Committee of Council; but the Board of Education Act, 1899, abolished the Committee and established the Board of Education with a President and Parliamentary Secretary. The Judicial Committee of the Council is really a court of law with special powers, which include the decision of appeals from colonial and from ecclesiastical courts.

Probability, mathematically treated, seeks to reduce to some definite form the value of the chance of any event occurring, or the value of any statement considered with respect to the conditions under which it was made. If it be equally likely that a certain operation succeed or fail, the chance that either happens is represented by $\frac{1}{2}$. It might be said that $\frac{1}{2}$ is the mathematical value of complete ignorance; for if a coming event may happen in two ways and we have some knowledge which leads us to think it will favour one mode of occurrence, then the probability will not be $\frac{1}{2}$ that this mode is the one followed, but will be a fraction greater than $\frac{1}{2}$. Blaise Pascal (1623-62) was the first scientist who investigated the subject from a

mathematical point of view and he has therefore been regarded as the founder of the science. A problem was propounded to him by the Chevalier de Méré (1610-85) which is now known as the "problem of points." It is this:—Two players have each gained a certain number of points when the game is interrupted; how should the stakes be divided? Pascal and Pierre Fermat (1601-65) both considered the question at some length and were thence led to other problems of a similar nature. Many problems deal with the chance of two particular events happening together when we know the chance of each by itself. Thus, suppose A's chance of obtaining a scholarship is $\frac{2}{3}$ and B's chance of winning a prize is $\frac{1}{4}$, the probability that both succeed is $\frac{2}{3} \times \frac{1}{4} = \frac{1}{6}$; the odds are 2 : 1 against. The chance that both fail is $(1 - \frac{2}{3}) \times (1 - \frac{1}{4}) = \frac{1}{6}$, or 9 : 1 against; the chance of A's success and B's failure is $\frac{2}{3} \times \frac{3}{4} = \frac{1}{2}$, that of A's failure and B's success is $\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$. It is seen that $\frac{1}{6} + \frac{1}{6} + \frac{1}{2} + \frac{1}{12} = 1$, which states that one of the combinations must happen, an obvious result. Experience of the past gives us some idea of the probability of future events in many cases. When a person invests his money in a lottery ticket, his chance of winning is determined by the number of prizes and blanks; but his expectation is considered as his chance of winning multiplied by the value of the prize. Jacques Bernouilli (1654-1705) showed that this does not measure the advantage to any person, for that will depend on his worldly wealth, and he considered that any sum of money would have a definite "moral value" for different persons, the moral value being roughly equal to the sum divided by the fortune of the person. This is a perfectly common way of viewing things and it is considered that £1 is the same to a man whose income is £100 as £10 is to a man receiving £1,000. The income tax is supposed to be paid to a large extent in accordance with this principle. The great practical uses of the theory of probability are in determining the nearest true results from a series of observations (*i.e.*, in giving a value to each observation and its accompanying error) and in the application of statistics. In the calculations of insurances and annuities probability plays a most important part and has led to the construction of tables of mortality whose use is recognised in all commercial countries.

Probate, the official copy of a will or testament made out on parchment under the seal, formerly of the ordinary, but now of the Court of Probate, and usually delivered to the executor, or "administrator with will annexed," as it is termed where no executor is appointed by the will, together with a certificate of the will having been proved. It is the authority under which an executor or administrator acts.

Probate Court, which took the place of the Prerogative Courts, was created in 1858 and is included in the Probate, Divorce and Admiralty Division of the High Court of Justice since the Judicature Acts of 1873-5. Its jurisdiction has to do with the succession to personal estate. A will

must be verified as the authentic will of the testator and as having been duly executed and witnessed, the right to the personal estate being vested in the executors appointed. It is proved by depositing it in one of the registries of the Court and making affidavit as to the amount of the property, by which the amount of the probate duty payable is determined. The executors obtain a grant of administration with a copy of the will, which, when they claim the property, is exhibited to the bankers. If any question as to authenticity arises the will must be proved in court. Where there is no will the estate devolves on the widow or the next of kin, as the case may be. If no executor has been appointed or the executor declines to act, two sureties must attend and enter into a bond for the faithful administration of the estate unless it does not exceed £50, or the widower is the applicant, in which case one surety only is necessary.

Proboscidea, an order of Mammals represented by the Indian and African Elephants and, among extinct animals, by the Mammoth, Deinotherium and Elephas antiquus. According to older classifications, however, the elephants, along with the horse, rhinoceros, tapir, coney, pig and hippopotamus, were grouped together in an order called Pachydermata, or thick-skinned hoofed animals, an order divided by later naturalists into the Proboscidea, Hyracoidea and Ungulata. The order takes its name from the elephant's trunk or proboscis, which is really a great prolongation of the nose, consisting of two tubes separated by a septum. At the extremity, on the upper side, above the opening of the nostrils, is a lengthened process, which Professor Boyd Dawkins says may be "looked upon in the light of a finger," beneath which is "a tubercle, opposable to it and acting, so to speak, as a thumb." The extent of the proboscis does away with the necessity for a long neck, a short muscular neck being essential for the support of the immense head and tusks.

Proboscis Monkey (*Nasalis larvatus*), from Borneo, allied to the genus Semnopithecus. The head and body of the adult male are about thirty inches long, and the tail is nearly as much more. The fur is brightly-coloured, and the nose is enormously developed; whence the name. The organ begins as a small "turn-up," but grows with age and ultimately projects—naked and of a reddish-brown flesh colour—several inches in front of the mouth. The nose is an anatomical excrescence. It is purely fleshy, no bones being cut through when it is removed, nor, were the skull dissected, would there be anything to show that such a feature was ever attached to it. The Dyaks consider the creatures to be degraded men, who abandoned human habits and dwellings and took to living in the woods rather than pay taxes. They wander about swamps and jungles at sunrise and sunset, being quiet during the day. They possess fine voices and are excellent jumpers, being able to clear from fifteen to twenty feet with ease, as they bound from tree to tree.

Probus, MARCUS AURELIUS, Roman Emperor, was a native of Pannonia. His military qualities led to rapid promotion and when the Emperor Tacitus died in A.D. 276 he was proclaimed his successor by the soldiers. During a short reign of six years the enemies of Rome were beaten back on all sides, Persia in particular being compelled to make peace. But Probus lost his short-lived popularity by the strict discipline he endeavoured to enforce, and in 282 was murdered near Sirmium, his birthplace.

Proclus, the Greek philosopher, was born at Constantinople in A.D. 411. He studied Aristotle and Plato under Heliodorus at Alexandria and was instructed in theurgic mysteries at Athens by a philosopher named Plutarch and the priestess of Eleusis. He was banished from the city by the Christians on account of his aggressive proselytism, but was afterwards allowed to return and died there in 485. Proclus was surnamed Diadochos, or "the Successor," because he followed Syrianus as head of the Athenian school. He was the last of the great Neoplatonists and his influence survived for a thousand years until, in fact, the thinkers of the Middle Ages returned to Plato and Aristotle.

Procopius, historian of the Eastern Roman Empire, was born at Cæsarea in Palestine about A.D. 490, and became a lawyer at Constantinople. He accompanied Belisarius as legal assessor in the war against the Persians (526), in the campaign against the Vandals of Africa (533) and in the war with the Ostrogoths in Italy (536). On his return to Constantinople he devoted himself to narrating the *Historiæ* of these three separate wars. Two books are occupied with an account of the protracted struggle of the Emperors Justin and Justinian against the Persian Kings Kobad and Chosroes Anushirvan (526-550); two with the Vandal war in Africa, describing the conquest of the kingdom (532-546) and four with a narrative of the campaigns in Italy and Sicily against the Ostrogoths (536-552). These wars are described partly from personal experience and partly from secondhand sources. The *Historiæ* are exceptionally valuable for their geography and ethnography, Procopius proving himself an accurate observer and impartial recorder. He also wrote *De Edificiis*, an account of the public works constructed throughout the Empire by Justinian, who is fulsomely flattered. The *Anekdotæ* or *Historia Arcana*, ascribed to Procopius and probably his, is a secret history, or scandalous chronicle, containing a bitter attack on Justinian, Theodora and other personages. Procopius died about 565.

Procrustes, a notorious robber of ancient Greece, whose doings made him the terror of Attica. He provided his victims with an iron bed, and if they were too short for it he stretched their limbs till they fitted it, while if they were too long he cut off the part that exceeded, thus still securing a proper fit. Hence has arisen the phrase of a "Procrustean bed," usually employed of an arbitrary critic who knows or has only one measure or

standard of criticism, to which, whether it apply or not, he attempts to adapt all his subjects. The original villain flourished in the 13th century B.C. and was slain by Theseus near the river Cephissus.

Procter, ADELAIDE ANNE, poetess, was born in London on October 30th, 1825. She was a delicate child and early began verse-writing, a habit fostered by her father ("Barry Cornwall") and her mother. She began to publish in 1843, when a poem by her appeared in the *Book of Beauty*. In later years she contributed fugitive verse to *Household Words*, *All the Year Round*, *Good Words* and the *Cornhill*. The first collected edition of her poems was published in 1858 under the title of *Legends and Lyrics* and in 1862 another volume, *A Chaplet of Verse*, appeared. She became a Roman Catholic in 1851 and, though prevented by indifferent health from taking an active public part in such movements, was greatly interested in all social questions concerning women. She died of consumption in London on February 2nd, 1864. Her songs "The Lost Chord" (set to music by Sir Arthur Sullivan), "Cleansing Fires" and "The Message" became extraordinarily popular.

Procter, BRYAN WALLER, poet, better known by his pseudonym of "BARRY CORNWALL," and father of the foregoing, was born in Leeds on November 21st, 1787. He became a solicitor, but literary pursuits largely occupied the earlier part of his life. He was on intimate terms with Charles Lamb, Leigh Hunt and other famous authors of the time and, in 1819, published his first book, *Dramatic Scenes and Other Poems*, which was rapidly followed by *Marcian Colonna* (1820), *A Sivilian Story* (1821), *Mirandola*—a tragedy which was produced at Covent Garden, with Charles Kemble as "Guido," to relieve his pecuniary embarrassments and yielded him £630—*Poetical Works* (1822), *The Flood of Thessaly* (1823) and *Effigies Poeticæ* (1824). He was called to the bar in 1831 and, in the following year, was made a commissioner in lunacy, "which," says Dr. Richard Garnett, "seems to have been thought an eminently suitable appointment for a poet." In the same year he produced his best work, *English Songs*, and henceforward wrote little more verse. In prose he published, among other things, a *Life of Edmund Kean* (1835) and *Charles Lamb* (1866). He retired from his commissionership in 1861 and died in London on October 5th, 1874. He was the friend of the great writers of two generations, of Wordsworth, Scott and Lamb no less than of Tennyson, Browning and Thackeray.

Proctor is derived through Middle English and Old French from the Latin *procurator*, "one who acts in place of another." Proctors are of three kinds:—(1) University officials whose duty it is to maintain order among the undergraduates and see that the statutes are observed. Nominally, their power extends to Bachelors of Arts also. At night they walk the streets attended by officers, popularly called "bull-dogs," who lay hands on the unwary undergraduate abroad without cap and gown. (2)

Officers who in Convocation represent either the chapter of a cathedral or the clergy of a diocese. (3) A class of practitioners in the Ecclesiastical and Admiralty Courts whose functions are now discharged by solicitors.

Proctor, RICHARD ANTHONY, astronomer, was born in Chelsea, London, on March 23rd, 1837, and studied at King's College, London, and St. John's, Cambridge, where in 1860 he was 23rd wrangler. He early devoted himself to astronomical studies and gave popular lectures in Great Britain, the United States and the British Colonies, besides conducting *Knowledge*, a scientific periodical which he founded in 1881. He was a voluminous writer, his marked gift for lucid exposition and his charm in popularising his science giving him (after several years of hardship) a wide vogue. Among his works were *Saturn and his System* (1865), *Handbook of the Stars* (1866), *Half-hours with a Telescope* (1868), *Other Worlds than Ours* (1870), *The Sun* (1871), *The Orbs Around Us* (1872), *The Moon* (1873), *The Transit of Venus* (1874), *The Universe of Stars* (1878), *The Great Pyramid* (1883) and *Other Suns than Ours* (1887). He was not averse from controversy and those who entered into a quarrel with him had need to be sure of their facts and position. He died in New York on September 12th, 1888. To him is due the theory of the solar corona and the accurate determination of the rotation of Mars.

Procurator-Fiscal, a Scottish law officer, appointed *ad vitam aut culpam* by the sheriff with the concurrence of the Secretary for Scotland, whose duty it is to initiate criminal proceedings in local and inferior courts and whose position is akin to that of public prosecutor in England. Since the institution of the Coroner's inquest is not known in Scotland, one of the functions of the procurator-fiscal is to inquire into deaths of a suspicious character and, if necessary, to apply for a warrant against any suspect and bring the case for trial. In cases of alleged crime, should he deem the evidence unsatisfactory he need not act himself, but may sanction a private person's beginning proceedings. After he has drawn up his statement of evidence this is submitted to the Lord Advocate, or other Crown counsel, who may or may not proceed to trial, according as the witnesses' depositions are sufficiently strong or the reverse.

Procyonids, a small family of bear-like mammals (Arctoidea). They are plantigrade—that is, they walk with the whole sole of both fore and hind feet placed on the ground—and, though not exclusively flesh-eaters, are classed with the Carnivora. They are found only in the New World, ranging from British Columbia in the north to Paraguay in the south. They include the Raccoon (*Procyon lotor*), the Coati (*Nasua narica*), with a prolonged pig-like snout, alluded to in its specific name, the Kinkajou (*Cercoptes caudivolutus*), with a perfectly prehensile tail, and the Vacomixle (*Bassaris astuta*), once placed with the Viverridæ or Civet family but now referred to the Procyonidæ,

of wholly arboreal habits and a great pet of the miners, whose provision bags it plunders. All the members feed on flesh, fruit, eggs, birds, insects, etc., and are practically omnivorous in their diet.



COATI.
(*Nasua narica*.)

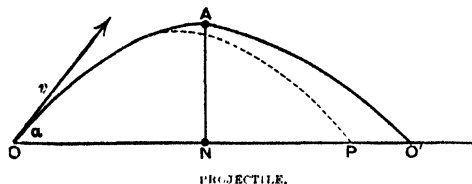
Professor. The use of this term to denote a public teacher in a university seems to have been derived from Italy. In the universities of Germany and Scotland the professors constitute both the governing body and the ordinary educational staff. At Oxford and Cambridge, on the other hand, their office gives them no share in administering the affairs of the university and attendance on their lectures is not compulsory, their place being taken under the inter-collegiate system by the tutors and lecturers of the colleges which have combined for purposes of instruction. In American universities each branch of instruction is commonly superintended by a professor, assisted by other professors and assistant-professors.

Profit and Loss Account, in book-keeping, the account showing the gains and losses arising from commercial transactions. The profits are placed on the creditor side and the loss on the debtor side of the account.

Profit-Sharing, a system adopted in some industrial establishments by which a workman receives a share of the products of labour in the shape of "profits" over and above his stipulated wage. The plan is said to have been first tried at Paris by Edme-Jean Leclaire (1801-72), a painter and decorator, in 1842. Various improvements have since been made on Leclaire's original scheme. At present the net profits are divided into four portions, one of which is reserved for the provident society and another as wages of management, the remaining half being paid to the labourers in cash. In Messrs. Godin's ironworks at Guise a different system is followed. Here the portion of the returns assigned to each labourer is held back till it amounts to a sum sufficient to purchase a share in the business. In 1880 the interest on workmen's capital was a little under one-eighth of the sum

paid in wages. In both these firms the practice is said to have been attended with the happiest results, though the system can hardly be said yet to have emerged from the experimental stage and it is still premature to generalise on the subject. Profit-sharing has also been introduced into Great Britain and the United States. At the formation of limited companies opportunity is sometimes afforded to employes to become shareholders by the founders setting apart a certain number of shares, which are purchased by the workers contributing so much per share every week until the shares have been fully paid. In such cases a receiving society is established which ballots weekly for the number of shares represented by the aggregate of the weekly contributions, the society not being dissolved until the last of the shares has been allotted. Circumstances permitting, a similar method of purchase may be adopted at a later stage than the formation of the company.

Projectile. A particle projected into space in any direction may have its velocity resolved into two components—horizontal and vertical. Under ideal conditions the horizontal velocity will remain absolutely unaltered for the whole time of motion and the vertical component will be accelerated by g (\approx about 32) feet per second. From these two factors the path of the moving body may be found. Let it start (see diagram) from O with a velocity v in a direction making an angle α with the horizontal $o' o'$; its vertical component is $v \sin \alpha$ and its horizontal component is $v \cos \alpha$. Let it reach A , the highest point in its path, in a time t and draw the vertical line $A N$. When the particle reaches A its vertical velocity is g and the velocity



upwards when it left O is the same numerically as it would gain if allowed to fall from A to N —that is, $v \sin \alpha = g t$. The space $A N = \frac{v^2 \sin^2 \alpha}{2g}$, or $t^2 = \frac{2}{g} A N$. $O N = v \cos \alpha \cdot t$, $\therefore O N^2 = v^2 \cos^2 \alpha \cdot t^2$ and, substituting $\frac{2}{g} A N$ for t^2 , we have $O N^2 = \frac{2 v^2 \cos^2 \alpha}{g} A N$. This is the equation to a parabola, A being taken as origin, and it can be shown that every point of the path fulfils the conditions of this equation. It is obvious that this curve is symmetrical about the line $A N$ and hence the range of flight, $O P$, is equal to $2 O N$. But

$2 O N = 2 v \cos \alpha \cdot t$; hence, substituting for t from the equation $v \sin \alpha = g t$, we have

$$2 O N = \frac{2 v^2 \cos \alpha \sin \alpha}{g} = \frac{v^2 \sin 2 \alpha}{g}$$

If we wish the range to be as great as possible for the velocity v , we must have $\sin 2 \alpha$ as large as possible—that is, $\sin 2 \alpha = 1$, $\therefore \alpha = 45^\circ$. In an ideal case, then, a shot fired at an angle of 45° will hit the ground further away from the gun than if fired at any other angle. The directrix of the parabola is a line parallel to $o' o'$ and at a distance $\frac{v^2}{2g}$ above it, and the parabolic paths of projectiles fired with the same velocity in all directions from O have the same directrix. Also the envelope of these different parabolas is another parabola. This is approximately exemplified by a fountain of water proceeding from a rose jet. In no practical case is the ideal parabola obtained; the horizontal velocity does not continue unchecked, but is retarded by the resistance of the air. The highest point on the trajectory (as the path is often called) will be nearer to O than A is and the curve will assume a steeper form (as shown in the diagram by the dotted line), the range being only $O P$ instead of $O P'$. The resistance of the air for moderate speeds varies with the square of the velocity, but for very high speeds it varies with the 6th power or more. Hence it is impossible for meteors, etc., to fall to the earth with a speed greater than some fixed amount.

Projection. Let $A B C D$ be points forming a plane or solid figure of any shape which it is desired to project from some point, s , on to a plane. From s , the centre of projection, let lines, or rays, $s A, s B$, etc., be drawn and let these lines cut the plane of projection in points $A' B' C' D'$. The figure $A' B' C' D'$ will then be a projection of the original figure on the plane. Any surface may be used instead of the plane and the result will be a projection of the figure on that surface. The projection of solids on to a plane in this way is often known as perspective. Projection mathematically treated is chiefly concerned with the projection of figures into other figures of the same dimensions. From the projection of plane figures into other plane figures a number of interesting results are obtained and their application to conics gives many new methods for solving theorems relating to these curves; for it is to be noted that by suitably choosing the centre and plane of projection any conic may be projected into any other conic. For many purposes it is desirable that solids should be represented by drawings on plane paper and so a simple method of projection is necessary. That known as orthographic is the most generally used. It was invented by Monge and is such that the centre of projection is at infinity and the rays—which are therefore all parallel—are drawn perpendicular to the plane of projection. It is generally convenient to take a horizontal plane for one projection, which is then called the “plan” of the figure, and a vertical plane for another, which is then called the “elevation” of the figure. In point of fact both

drawings are often executed on the same sheet of paper, it being imagined that the vertical plane containing the elevation was simply turned about the axis—the line in which it cut the horizontal plane—till it coincided with the horizontal one. This is known as “rebatting” the plane. Any point on the figure is represented by a point in both plan and elevation, the line joining the two being perpendicular to the axis. A plane is best represented by its traces—i.e., the lines in which it cuts the two planes of projection and which meet on the axis. A line can be represented either by its projections (lines) or its traces (points). Very often it is convenient to take a third plane for more complete representation of the model and when possible this is taken perpendicular to the other two planes. The projection obtained in this is often known as a side elevation. Usually the shape and size of the projection differ from those of the original, and practical problems have frequently to be solved in which it is required to deduce the size of the drawing from measurements of the model, or to discover the size of a required object from the dimensions of the drawings. Other problems of frequent occurrence are to make projections of sections of curved surfaces and to determine the curve in which two such surfaces cut each other. If we view any natural scene with one eye and imagine lines drawn from this eye to every visible object, these lines (which coincide with actual rays of light) will cut some chosen picture plane and if we then draw upon this picture plane the various points and their connecting lines, we should obtain an ideal perspective. To obtain this perfectly is the aim of good drawing, while the painter endeavours to add to the result the effect of the other eye and to indicate distance by the shading of his colours. To give a projection upon a curved surface is a more complicated matter, but such a projection is exemplified in the panorama, the curved surface being a cylinder. [PERSPECTIVE.]

Prolapse, the term applied to the descent of a portion of the rectum (prolapsus ani), or of the womb (prolapsus uteri). In the case of prolapse of the rectum a portion of the mucous membrane lining the bowel protrudes to the extent of from one inch to six inches or more. In children the irritability of the bowels and diarrhoea must be cured and the protrusion gently but steadily returned to its place. The membrane itself may be treated with astringent injections, or hamamelis, or a solution of tannic acid in glycerine. Rest is very desirable and for a time the bowels should be evacuated in the recumbent position. In adults, if no relief follow this treatment, operation will probably be necessary. In prolapse of the uterus, the womb descends partially or completely, causing discomfort, bearing-down pain and general inconvenience. The treatment involved is rest in bed for ten days or longer, which is absolutely essential, and replacement of the uterus with, if need be, support from mechanical contrivances; but such cases can only be safely dealt with by the family doctor.

Prolegs, the appendages on the abdomen of caterpillars by which locomotion is effected. The three pairs of appendages which develop into the legs of the adult insect are not used for walking in the caterpillar; they are small and used for holding the food on which the larva feeds.

Proletariate. In the constitution ascribed to Servius Tullius citizens of the sixth or lowest class in ancient Rome, whose value to the State was as rearers of offspring, were named *proletarii*, or landless men. Hence the term has come to signify that large class dependent on daily or casual employment, or even that still lower stratum of society which has been named “the residuum” and “the submerged tenth.” At the close of the Middle Ages, when the feudal system broke up, the old peasant proprietary, deprived of their small holdings, were driven by necessity into the towns, a tendency which various causes have continued to foster even at the present time. Thus the modern proletariate has arisen and with it socialism, an attempt to remedy grave social inequalities, the poverty of the poor, the unequal distribution of that wealth which labour produces. But labour cannot be carried on without the means to live, which are capital and land. The right of private ownership *versus* communism appears to be the crux of this social problem. The movement is far from complete and may prove merely a passing phase in the development of the community. In Great Britain, the United States, France and Russia it has had many keen students, while in Germany Karl Marx was probably the founder of international socialism. A man of masterly gifts he, more than any other, influenced the labour question in the 19th century. Bismarck, though he held socialism as subversive of society, so far respected its aims as to hold the State responsible for the care of its weaker members.

Prometheus (Greek, “forethought”), the great culture-hero of Greek mythology, was the son of Iapetus the Titan and Clymene. The oldest form of the myth is found in Hesiod, according to whom Prometheus, having outwitted Zeus and stolen fire from heaven, was chained to a rock, where his liver was torn every day by an eagle and made to grow again at night, while his brother Epimetheus (“after-thought”) was equally punished by the fatal gift of the virgin Pandora. In the *Prometheus Bound* of Æschylus the hero is the devoted friend of man, to whom he teaches all the arts of life and for whom he suffers all the wrath of Zeus, who, however, finally allows his place on the rock to be taken by the centaur Cheiron.

Promise, an undertaking to do or not to do a certain thing. Promises in law are either express or implied: express, when founded upon the express contract or declaration of the party promising; implied, when the promise is inferred from his acts, conduct, or peculiar position. Thus the law will always infer a promise by a debtor to pay a debt due to his creditor.

Promissory Note. In the words of the statute, this is defined as “an unconditional promise in

writing made by one person to another, signed by the maker, engaging to pay on demand, or at a fixed or determinable future time, a sum certain in money to or to the order of a specified person, or to bearer." The following is the usual form of such a note :—

Leeds, August 18th, 1951.

I promise to pay to Mr. William Smith or bearer Fifty pounds for value received.

JOHN JONES.

Pronghorn (*Antilocapra americana*), an aberrant antelope, about the size of a fallow-deer, from the prairie-lands of North America, being, in fact, one of the few forms of the hollow-horned ruminants found in the New World. Both sexes bear true horns. Those of the male are about a foot long, curved backwards at the tip, with a branch directed forwards rather more than half-way from the base. Those of the female are very much smaller. The horns—not antlers, be it noted—are detached annually from their supporting cores and afterwards dropped, to be replaced by others which, at the time of shedding, have already made some progress in growth, although at first they are very pale and soft. In this respect the Pronghorn differs from all other antelopes and entirely from the deer.

Proof Spirit consists of a mixture of alcohol and water containing about 49½ per cent. of alcohol. The original proof test was by the ignition of gunpowder. The spirit was poured upon some gunpowder and ignited; if when the liquor burnt out the gunpowder was also ignited the spirit was over proof and *vice versa*. By law proof spirit has at 51° F. a density ¼ relative to water at the same temperature. The number over proof is the quantity of water which must be added to 100 volumes of the spirit to reduce it to proof strength, or which must be abstracted if it is under proof. Thus if a whisky is sold at 25 over proof, if 25 volumes of water were added to 100 of the spirit the result would contain about 49½ per cent. of alcohol. The degree above or below proof is usually determined by the density of the liquor measured by some form of hydrometer or alcoholometer, the form known as Sikes's hydrometer being that commonly adopted.

Proofs, Correction of. When a manuscript has been set up into type, a proof of it is taken and submitted to the printer's reader, or corrector of the press, as he ought preferably to be styled. This, the first proof, is then carefully "read" for obvious mistakes, such as "literals" and misreadings of the "copy" by the compositor. These corrections having been made, a second proof is taken and sent to the author, who is expected to read it and return it promptly. (It should be said that in the case of book-work it is customary to send an author proofs in slip or galley form and then in page form. It is very desirable that he should make all extensive changes, especially by way of additions and deletions, in the slips, since should he postpone these to the

page proof he will, quite unnecessarily, cause much expense by the overrunning of matter and also, in many instances, increase his own bill of costs. The page proof is submitted to him really to enable him to take a "last look" at his work, so that he may be satisfied it is shipshape before being irrevocably printed and published.) This second proof, as returned corrected by the author, is then scrupulously "read" by the second corrector of the press. The alterations having been effected by the compositor, a third proof, or "revise," is taken and compared by the corrector with the second, to see that all corrections have been attended to. When he is satisfied with it, it is marked "Press" and returned to the composing-room to be prepared, with the rest of the book or magazine, for the printing-machine. A proof with few corrections is technically known as "clean"; one in which the corrections are heavy as "dirty." It is the latter kind that especially necessitates a revise. It will thus be seen that the post of corrector of the press is one of the utmost responsibility, since upon his knowledge, diligence and acumen depends the accuracy of the published matter. Accordingly the co-operation of a corrector is just as necessary to the production of a beautiful example of typography as is that of the printer and compositor. By use and wont the correctors of the press are regarded as forming a branch of the printing department, but a truer estimate of the value of their collaboration would rank them with the sub-editorial staff. As a rule editors and authors alike know the worth of the assistance rendered to them by correctors and are grateful for it. It will sometimes happen that the chief corrector is a stickler for the literal interpretation of his duties and with such "follow copy" is the invariable rule. But correctors who regard the spirit quite as much as the letter of their duty will not hesitate to query a statement or even the construction of a sentence. The editor or author who may resent this is sure to suffer sooner or later, for in the case of an author of proved petulance the order to "follow copy" will probably have disastrous effects. The London Association of Correctors of the Press, with headquarters in Chancery Lane, was founded in 1854. The general reader and particularly authors desirous of correcting their proofs with workmanlike precision will find on the next page an example of a proof with the corrector's marks. It will be instructive to examine it along with the following explanation of the marks used by the corrector :—

1, insert quotation marks; 2, a word thrice underlined should be printed in capitals; 3, a word underlined twice should be in small capitals; transpose; 5, insert word; 6, wrong word; word should be in Roman type, not italic. A word printed in proof in Roman which should be put in italic type is underlined once and marked in the margin "ital."; 8, used for more space between words or letters. In the proof "country in" a printed so closely together they look like one word; 9, letter upside down; 10, mark of new paragraph; 11, a word in ordinary type to be printed in small capitals; 12, a blurred or faulty letter; 13, delete the surplus "u" in "true": the sign is the fit

letter (rather like a Greek delta) of "delete"; 14, the wrong fount of type; 15, insert "— (closing quotation marks and dash); 16, wrong letter; 17, insert comma; 18, more space: see 8; 19, lower

lines; 25, insert "before the law"; 26, insert "b' (in "indispensable"); 27, stet means "let it stand" that is, the words "July 4, 1894," first marked for deletion, are to be retained.

1. ∇	2. caps.	It is true, as the new First <u>Magistrate</u>	
3. Sm. caps.		of the Republic <u>feliculously</u> observes	16. e/17. 9/
4. trs		that the ease <u>regularity</u> (and) with	
		which the constitutional machinery	18. #
5. are/		has worked under circumstances of	
6. stability/		so exceptional a kind in them-	19. l.c.
7. rom.		selves a gratifying proof of the	20. run on
		integrity of the Institutions which	
8. # 9)		<u>France</u> has chosen for herself.	21. le
10. New par.		In no country in the world could the	22. 1
11. Sm caps.		supreme administrative power have	23. O
12. x		been transferred more quietly from	24. =
		the hands of one ruler to those of	25. b/
13. 2	14. w.p.	another. "The general purport of the	27. Stet
		President's message can but serve	
15. the H/		to strengthen and confirm the confidence	
		in Republican institutions of	
		which his tranquil accession to office	
		has afforded so signal a proof/ It	
		breathes throughout the spirit of	
		true liberty and the spirit of that	
		order which is the indispensable	
		safeguard of all real and abiding	
		freedom. <u>The Times, July 4, 1894.</u>	
		25. before the law/	

PROOF AS RECEIVED BY THE COMPOSITOR FROM THE READER.

N.B.—It will be understood that the figures are inserted here merely for the sake of the explanation.

case (small instead of capital "i"); 20, "In no country" must follow "herself" without the end of a paragraph: that is, the text must run on in narrative form; 21, correct spelling: the two letters have simply been transposed and this might also have been marked "trs."; 22, means delete the black mark (a "space" has printed up instead of being depressed); 23, replace a comma with a full stop; 24, make straight or even the letters or

After having been corrected by the compositor in accordance with the foregoing signs, the text will read as follows:—

"It is true, as the new First **MAGIS** **TRATE** of the **REPUBLIC** **felicitousl** observes, that the ease and regularity

with which the constitutional machinery has worked under circumstances of so exceptional a kind are in themselves a gratifying proof of the stability of the institutions which France has chosen for herself. In no country in the world could the supreme administrative power have been transferred more quietly from the hands of one ruler to those of another.

“The general purport of the PRESIDENT’S message can but serve to strengthen and confirm the confidence in Republican institutions of which his tranquil accession to office has afforded so signal a proof. It breathes throughout the spirit of true liberty and the spirit of that order before the law which is the indispensable safeguard of all real and abiding freedom.”—*The Times*, July 4, 1894.

MATTER AFTER BEING CORRECTED BY THE COMPOSITOR.

Propertius, SEXTUS, the Latin elegiac poet, was born about 50 B.C. at Asisium (modern Assisi) in Umbria, Italy. Almost the only material for his biography is derived from his own writings. His early life seems to have been full of sorrows. His father died while he was still young, the family estate was confiscated to satisfy the greed of the soldiers after the battle of Philippi (42) and another relation fell in the Perugian insurrection. He accompanied his mother to Rome in 34 and there he soon began his literary career, being patronised by Tullus and later by Mæcenas. He was a friend of Ovid and an acquaintance of Virgil, but does not seem to have known Tibullus, while he was not on too friendly terms with Horace. The date of his death cannot be exactly fixed, but it is presumed he died before he was 40. In his elegies Propertius closely followed Greek models, but they are notable for their emotional power and wealth of appropriate and striking language. If, as Professor Postgate says, “his style seems to unite every element by which a reader could be

deterred,” Propertius might almost appear to have anticipated Robert Browning. “But those who have the will and patience to surmount [the obstacles to his study] will find their trouble well repaid.” In which respect, too, he would seem to resemble Browning.

Propionic Acid, an organic acid of the formula $C_3H_5O_2$, or $C_3H_7 \cdot CO_2H$. It is one of the series known as the fatty acids and is closely allied chemically to acetic acid. It may be prepared by a number of reactions, many of them common to the whole series of the fatty acids. It is a colourless liquid, possessing a pungent odour. It boils at about $140^\circ C$. It gives rise to many substitutive derivations, forming two series of monoderivatives and three series of diderivatives. Of the first series the isomeric lactic acids may be taken as examples, the hydrogen being replaced by OH, yielding the compounds $C_3H_4OH \cdot (CO_2H)$.

Proportion. Four quantities are asserted to be in proportion when the ratio between two of them is equal to the ratio between the other two.

Thus a, b, c, d are proportionals when $\frac{a}{b} = \frac{c}{d}$ and

this is often written $a : b :: c : d$. Since $\frac{a}{b} = \frac{c}{d}$

it follows that $ad = cb$, or the product of the means (b and c) is equal to the product of the

extremes (a and d), and $d = \frac{cb}{a}$, which gives a

means of finding a fourth proportion when the three others are known. This is the basis of the

arithmetical rule. If $\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = \frac{d}{e}$, the

quantities a, b, c, d are said to be in continued proportion. A special case of this is given when

there are but three quantities. Then, as $\frac{a}{b} = \frac{b}{c}$, it

follows that $b^2 = ac$ and b is said to be a mean

proportional to a and c . Also $\frac{a}{c} = \frac{a^2}{b^2}$ —i.e., the

first is to the third in the duplicate ratio of the first to the second. This and many other theorems relating to proportion occur in Euclid’s fifth book. Among them may be noted that if $a : b :: c : d$, then $b : a :: d : c$, which is known as invertendo; also $a : c :: b : d$ (alternando); $a + b : b :: c + d : d$ (componendo); $a - b : b :: c - d : d$ (dividendo); $a + b : a - b :: c + d : c - d$ (componendo and dividendo). Euclid’s definition of proportion is as follows:—The first of four magnitudes is said to have the same ratio to the second as the third has to the fourth when any equimultiple whatever of the first and third being taken, and any equimultiple whatever of the second and fourth, if the multiple of the first be less than, equal to, or greater than that of the second, the multiple of the third is less than, equal to, or greater than that of the fourth. This may be algebraically written a, b, c, d

are proportionals when $p \begin{matrix} > \\ < \end{matrix} q$ d , according as

$p a = q b$, p and q being any positive integers. From Euclid's definition stated in this form it is easy to prove the algebraical definition that $\frac{a}{b} = \frac{c}{d}$

and *vice versa*. The wordiness of Euclid's definition is due to the fact that he made it include incommensurable quantities as well as commensurable ones.

Propyl, the radical, or group of elements C_3H_7 , which exists in a large number of compounds: the propyl compounds—e.g., propyl chloride, C_3H_7Cl ; propyl alcohol, C_3H_7OH ; isopropyl iodide, C_3H_7I , etc., the last-named radical, isopropyl, possessing the same composition but differing in the arrangement of the atoms in the group.

Prosecutor. A prosecutor is one who takes action against another in the name of the Crown. In criminal matters the suit is described as one by "His Majesty the King on the prosecution of A.B. against C.D. [the prisoner]." The prosecutor may be and usually is a private person and he is generally the person specially injured by the crime. When the crime is of a heinous nature, or likely to go unpunished for want of a prosecutor, the proceedings are conducted by the Director of Public Prosecutions in the name of the Attorney-General, who is, however, sometimes difficult to move. In Scotland prosecutions may be initiated by a law officer called the procurator-fiscal.

Proselytes (Greek, *proselutos*, "one who has arrived"; "a sojourner"), the name by which the converts to Judaism were known. They were of two classes—Proselytes of the Covenant, or of righteousness, who fully accepted the doctrines and observances of the Jews, and Proselytes of the Gate, those who renounced idolatry and undertook to submit to the Seven Commandments of the Sons of Noah so that they might be able to live in Palestine. The word has an extended meaning and is now applied to those who newly embrace any system, creed or party, man being, in Carlyle's opinion, "emphatically a proselytising creature." Freemasons, however, are forbidden to proselytise.

Proserpina (Greek, *Persephone*), the bride of Pluto and Queen of Death, was, according to Homer, the daughter of Zeus and Demeter. The story of her abduction by Pluto first appears in Hesiod. As she was gathering flowers in a meadow the earth suddenly opened and Pluto, god of the nether world, carried her off to become his queen. The scene of this legend has been referred to Eleusis, Lerna and "that fair field of Enna" in Sicily. Her mother sought her far and near, but not finding her forbade the soil to yield its increase. Mankind would have perished had not Zeus induced Pluto to release her. This he could not do unconditionally, since Proserpina had partaken of a pomegranate and, having thus eaten of the food of the dead, could not remain away for ever. A compromise was therefore effected and she was allowed to spend eight months (or six, according to some versions of the myth) of the year with her

mother and the remainder in the gloomy regions of Pluto. Her return to the upper world symbolised spring and her disappearance autumn and she is thus worshipped with Demeter or Ceres as the Goddess of Nature.

Prosit (3rd person singular of the present subjunctive of the Latin verb *prodesse*, "to be of use," "to do good"). In a specific sense it has come to be adopted as a salutation employed chiefly among Germans and Scandinavians and particularly university students in drinking healths. It is thus equivalent to the English "Good luck!" or the Scots "Here's tac ye!"

Prostate Gland, a glandular body, about the size of a chestnut, which surrounds the male urethra in the first portion of its course from its origin at the neck of the bladder. Chronic enlargement of the prostate sometimes occurs in males (rarely before the attainment of fifty-five years of age) and leads to difficulty in micturition and, it may be, to actual retention of urine.

Protagoras, one of the earliest Greek Sophists, was born at Abdera, in Thrace, probably about 481 B.C. and lectured in the chief towns of Greece and Sicily. At the age of seventy he was convicted of atheism and fled from Athens, but perished at sea on his way to Sicily about 411. He maintained the superior claims of education and good conduct over instruction and physical research. His notion of education was largely literary, since it comprised oratory, grammar, style and criticism of the poets. He supplemented his lectures by debates among his pupils. Scarcely anything has survived of his treatises on Truth, the Gods and other subjects. Although Abdera produced three philosophers its inhabitants became a by-word for dullness and stupidity.

Protection, in political economy, is the system of developing the industries of a country by imposing duties on imported products which compete with those of home industries, although protection of an industry inevitably places the consumer at the mercy of the manufacturer so protected. [FREE TRADE.]

Proteids. The proteids or albuminoids are an important class of organic compounds. In very many of their properties they closely resemble one another, while their chemical composition, or at least their percentage chemical composition, only varies within slight limits. They all contain hydrogen, carbon, oxygen and nitrogen, while small quantities of sulphur (and often phosphorus) are usually present. Their importance to the human economy is due to the fact that animals are incapable of deriving their supply of nitrogen necessary for the maintenance of life from inorganic sources of this element. Proteids are hence an essential food-stuff, deprivation of which results in starvation. The proteids in the human system pass into the blood only after their conversion into a soluble proteid—peptone—which is effected by the fermentation induced by the pepsin of the gastric juice and the pancreatin of the pancreatic secretion,

both of which substances are themselves proteid materials. Amongst the more common of these compounds are: albumin, present in white of egg and in blood serum; myosin, the proteid material of muscle and lean meat; casein, existing in milk and cheese; fibrin, present in the blood; globulin, a component of many animal tissues; chondrine, which exists in cartilage; vitellin, in the yolk of eggs. Gelatine appears to be very closely allied to the proteids, but cannot act as a nitrogenous food in the same manner as the proteids proper. Many substances also of vegetable origin are closely allied to these animal compounds and are spoken of as vegetable proteids.

Proteolepas, the only known genus of the group Apoda of the Cirripedia. *Proteolepas vivincta* is about one-fifth of an inch long and resembles the larva of an insect.

Proteomyxa, a group of the simple unicellular animals belonging to the great group of the Protozoa. Most of them live in fresh water. The best-known members are the Monads and the Monera. They are all very simple in structure and some appear never to have a nucleus, e.g., *Archerina*, so that they are "cytodes" and not "cells." Many of the Monera resemble simple types of the "Heliozoa"; thus *Archerina* is much like the small "Sun-animalcule" or *Actinophrys*. Many of the Monads are parasitic: thus one species of *Protomonas* lives in the fresh-water Alga *Spirogyra*, and *Colpodella* in the minute Infusorian *Chlamydomonas*, and *Gymnococcus foekelii* on diatoms. One group, the *Plasmodiophorea*, lives in plant-roots: thus *Plasmodiophora brassicæ* injures the roots of various species of vegetables of the genus *Brassica*; it is the cause of the disease known as "Fingers and Toes." The members of this group, however, may be really vegetables, as they are assigned by most botanists to the Slime Fungi or *Myxomycetes*. *Bursulla*, the only member of its family, lives on horse-dung. Our knowledge of the *Proteomyxa* is still very limited and it is probable that when more is known the group will be broken up.

Protestantism had its rise in the disputes between Luther and the Ultramontane party in Germany in the 16th century. At the Diet of the princes which met under the Archduke Ferdinand, brother of the Emperor Charles V., at Spire in Bavaria, in 1529, the majority revoked the Edict of 1526 which introduced the marriage of the clergy, the administration of the sacrament in both kinds and other changes and decreed that until a General Council of the Church was summoned each prince should settle religious questions within his own dominions. The Diet forbade further innovations in religion and the States which had accepted the new doctrines were ordered to retrace their steps. This called forth a remonstrance in the form of a protest from the minority on April 19th, 1529. And this, wrote Sleidan, is the origin of the name Protestants, which on the Continent is applied to Lutherans, Calvinists being known as the Reformed. The term was not cordially accepted by English Reformers so zealous even as Bishop Ridley,

although so loyal a prelate as Archbishop Laud did not scruple to use it. "The Protestants," he says, after explaining its historical and Catholic usage, "did not get that name by protesting against the Church of Rome, but by protesting, and that when nothing else would serve, against her errors and superstitions." The word is repudiated by a considerable section of the English Church as not being contained in any of her formularies, as of too negative a character and as being the name used by Socinian sects. But as a watchword, rallying all who, however widely they differ individually, are ready to join in common action against the Church of Rome, it has always proved effective. There were Christian communities, small in number, before the time of Luther which were Protestant in effect though not in name, such as the Albigenians who had been exterminated by Rome, the Waldensians who survived relentless persecution, the Hussites and the Bohemian Brethren.

Proteus, Homer's Old Man of the Sea, tended the seals of Poseidon or Neptune and had the power of prophecy, which, however, he was extremely reluctant to exercise. It was therefore a very difficult matter to consult him. His home was in a cave by the sea (on the island of Pharos, off the mouth of the Nile, according to Homer; somewhere in the sea between Crete and Rhodes, according to Virgil), where he indulged in a noon-tide siesta. Even when caught he was such a slippery customer that he constantly attempted to escape by changing his shape. But if the captor meant business and would not let him go, then he assumed his own form and answered his questioner. In allusion to his skill in quick change the adjective "Protean" was invented, meaning "exceedingly variable," "everything by turns and nothing long." Another myth makes him a son of Poseidon and a king of Egypt, who receives Helen on her flight thither and restores her to Menelaus.

Proteus, a genus of tailed Amphibians, with persistent gills, from the subterranean waters of Carniola and Dalmatia. There are two or three species. Rudimentary lungs are pre-ent; their eyes are hidden in the skin, but the animals are sensitive to light. The eel-shaped *Proteus* is the type. When swimming it looks like a lizard, with small, very distinct hind and fore limbs, but it has a tuft of branchiæ on each side of the neck. It is over twelve inches long, as thick as a man's finger and its tail is compressed vertically. There are three short digits on the fore limbs and two on the hind. They are flesh-coloured, with coral-red gills. The blood corpuscles are enormous, being about fifteen times the size of those in man.

Prothallium, otherwise written PROTHALLUS, is the gametophyte of the Pteridophyta, i.e., that plant, generation, or stage in the life-cycle which bears the sexual reproductive organs. It is a small thalloid body, often nothing but a plate of cells one cell thick, leading a short but independent life and without any trace of vascular tissue. It may, or may not, contain chlorophyll. In heterosporous forms the prothallia are reduced to mere minute

appendages of the spores and in homosporous groups they may be dioecious, bearing only antheridia or only archegonia.

Protista, a term suggested by Professor Ernst Haeckel (b. 1834) for those organisms which cannot be definitely referred to either the animal or vegetable kingdom. As, however, no precise limit can be placed upon its extent in either direction, its adoption would only double the difficulty which now is single, and thus it has not been generally adopted.

Protophyta, a provisional name for the lowest grade of plants, whether algal or fungal, in which no sexual process was known or seemed to have existed, they being unicellular bodies reproducing themselves by mere division. The group included the Cyanophyceæ and some Chlorophyceæ and Phæophyceæ among Algæ and the Schizomycetes and Myxomycetes among Fungi.

Protoplasm—the so-called “physical basis of life”—is a substance which possesses the properties of spontaneous movement, nutrition, excretion and reproduction and constitutes the simplest of living organisms. It consists essentially of hydrogen, oxygen, carbon and nitrogen, with a certain amount of sulphur, phosphorus, potassium and sodium; other elements are usually present in addition. Its chemical composition is therefore complex, while, as it is almost impossible to get it pure from waste food products, its quantitative analysis has not been satisfactorily determined. Its essential property is its power of movement spontaneously under certain irritation. This however, is accompanied by a necessary oxidation of part of its constituents. To counterbalance this and keep up the supply of unoxidised material, the protoplasm has to feed; the waste products formed by the oxidation or absorbed with the food have also to be got rid of, which is secured by the process of excretion. If the protoplasm absorbs more food than is required to supply the waste due to movements, it increases in bulk; and when the particle of protoplasm has increased so as to be inconveniently large, it subdivides and reproduction is effected. This is usually determined by the agency of a specialised part of the protoplasm known as the nucleus, but certain of the *Proteomyxa* have no such structure but have the power of reproduction. The simplest method of studying the movements, etc., of protoplasm is the observation of the white corpuscles of the blood, or the common fresh-water *Amœba*, or *Proteus-Animalcule*.

Prototheria. [MAMMALS.]

Prototracheata, the class of Arthropoda which includes the remarkable worm-like animal known as *Peripatus*.

Protozoa, one of the two sub-kingsdoms of animals. It includes all the unicellular animals—namely, those which consist of a single cell or “cytode”; a certain fusion of cells may occur, but in such cases there is no specialisation of function and the animal consists simply of an aggregate of

individual cells all like one another. It is difficult to form any precise definition of the group; the simple statement that it includes “only all unicellular animals” is indefinite owing to the impossibility of satisfactorily defining the word “animals.” Many zoologists now include among the Protozoa many forms also claimed by the botanist [ANIMAL KINGDOM], such as *Volvox* and many of the Slime Fungi or Myxomycetes. The classification of the Protozoa is as follows:—

1. Rhizopoda, including those which are provided with pseudopodia.
 - (a) Heliozoa.
 - (b) Radiolaria.
 - (c) Foraminifera.
 - (d) Amœbina.
 - (e) Mycetozoa (Slime Fungi; probably vegetable).
 - (f) Labyrinthulida.
 - (g) *Proteomyxa*.
2. Endoparasita. Internal Parasites.
 - (a) Sporozoa or Gregarinida.
 - (b) Amœbosporidia.
 - (c) Sarcosporidia.
 - (d) Myxosporidia.
3. Plegopoda, which move by vibratile processes.
 - (a) Acinetaria.
 - (b) Infusoria.
 - (c) Mastigophora.

The Protozoa are almost universally distributed at present, occurring in the sea, fresh water, on land, in the air and parasitic in both animals and plants. As they are usually minute and have no hard parts, most of the classes are not known as fossils; the Radiolaria and Foraminifera are, however, very important to geologists owing to the wealth of the fossil forms, while extinct representatives of the Infusoria are known.

Proudhon, PIERRE JOSEPH, political economist, was born, the son of a cooper, at Besançon, department of Doubs, France, on January 16th, 1809. Having received a scholarship from the academy of Besançon for some inconsiderable philological works which he had written while he was occupied as a printer, he went to Paris and published his *Qu'est-ce que la Propriété?* (1840). “Property is robbery” (“*la propriété c'est le vol*”) was the conclusion at which he arrived in his book. For his *Avertissement aux Propriétaires* (1842), a similar work, he was tried but acquitted. He published several books dealing with economics and in 1848 was elected member of the Assembly for the department of the Seine, but was denied a hearing owing to what was thought the extravagance of his views. The paper which he then edited—*Le Peuple*—was prosecuted and suppressed and he had to leave France to escape fine and imprisonment. Passing through Paris, however, on his way to Switzerland he was arrested and lodged in Sainte Pélagie, where he carried on his paper, was married and wrote *Les Confessions d'un Révolutionnaire*. Having in 1858 published *Justice dans la Révolution et dans l'Eglise*, he was again sentenced to imprison-

ment and fled to Belgium. His literary activity continued in full swing at Brussels and he wrote there, among other things, his *La Guerre et La Paix* (1861) and *Théorie de l'Impôt* (1861). The Belgian authorities viewing his continued residence in their country with suspicion (as a Napoleonic agent to promote annexation), he returned to Paris (1862) and died at Passy on January 16th, 1865.

Prout, SAMUEL, water-colour painter, was born at Plymouth, Devonshire, England, on September 17th, 1783. He was educated at the grammar school of his native town and, showing an early turn for art, attended drawing classes where he met Benjamin Robert Haydon. In 1802 he went to London to illustrate John Britton's *Beauties of England and Wales*. In 1803 he first exhibited at the Royal Academy and soon became



SAMUEL PROUT.

(From the *Crayon Drawing* by Charles Turner in the *National Portrait Gallery*.)

well known for his delineation of country scenes. In 1815 he was elected to the Water Colour Society and in 1818 made a tour in Normandy, in the picturesque old towns of which he discovered subjects which he drew with perfect sympathy. He extended his travels in the next few years to other parts of France, Italy and Switzerland and the water-colour drawings he made in the various towns greatly enhanced his reputation without advancing his prices. During the latter part of his life his health was much broken and he died in London on February 9th, 1852. His work is characterised by great breadth and his treatment of light and shade is effective; he had a fine eye for composition,

making his pictures live again by the skilful management of his foregrounds and accessories, and handled the venerable buildings as if he loved them. Pictures for which he got five guineas with difficulty now easily fetch five hundred guineas.

Prout's Law. It was assumed in 1815 by the chemist William Prout (1785-1850) that all the supposed elementary substances arose out of the condensation of a primordial matter or "protyle." This substance was supposed to be identical with hydrogen and, as each of the other atoms was formed by the condensation of a definite number of hydrogen atoms, it followed that the atomic weights of all the elements should be integral multiples of that of hydrogen. This is what is usually meant by Prout's hypothesis or Prout's law. At first the data at the disposal of chemists were insufficient to test this adequately, but, as fresh and accurate determinations of atomic weights were made, it became evident that it could not be held as valid. In spite of some alterations made to account for certain discrepancies—such as halving the hydrogen atom—the law at present is not sufficiently supported, although the number of elements whose atomic weights do approach very nearly to integral values is a remarkable fact.

Provence, an old province of the S.E. of France, now divided into the departments of Basses-Alpes, Bouches-du-Rhône, Var, the eastern part of Vaucluse and a small part of Alpes-Maritimes. It formed the Provincia of the Romans and at the disruption of the Empire fell into the hands, first of the Visigoths, next of the Ostrogoths and was then conquered by Clovis. In 879 Boson, the governor, caused himself to be elected king and founded a dynasty which lasted until 1481, when Louis XI. united the territory to France. Possessing for the most part a fertile soil and enjoying a fine climate, Provence produces almost all the vegetables and fruits of Europe. The mineral wealth is considerable, but remains undeveloped. The Provençal troubadours exercised a pronounced influence on French poetry and the tongue, one of the Romance languages, has—after a long period of dormancy—again become the medium of native literary talent.

Proverbs were defined by Robert South as "the experience and observation of several ages gathered and summed up into one expression," or, as Earl Russell more tersely said, "the wisdom of many and the wit of one." Any apophthegm, i.e., brief, instructive saying, may become a proverb, but to attain that dignity it not only requires age but must also be of universal application. Howell quaintly describes the ingredients to be sense, shortness and salt, but a wise man's utterances, be they never so wise, will not rank as proverbs unless they obtain popular currency. Not every proverb originated in a shrewd saying. Some, which come to us from the East, contain the essence of a fable, as "One sheep follows another"; but, "It is not for my own sake," said the fox, "that I say there is good goose-green in the wood" is Danish. Purists might object that these are not strictly proverbs.

Proverbial expressions are commonly and often unconsciously used. Every coterie and even family has among its members its own forms of expression. That which began as a private jest passes into the street and into the town, from thence to the nation and from one country to another. Each nation has its own wayside sayings, as the word literally meant in its inception, and classification by nationality is difficult if not impossible. Their proverbs are coloured by their own national characteristics. The Greeks before the Christian era had "Owls to Athens" (in whose woods these birds abounded), which in the Middle Ages became "Send Indulgences to Rome," and the idea appears in England as "Carrying coals to Newcastle." But the bulk of the proverbs in their passage from the East to the West or from West to East prove to belong to a common stock, originating in the common experiences of mankind in all climes and ages. They are not to be considered mere idle triflings. Solomon compiled a collection of the sayings of the sages of Israel. Plutarch made a famous collection, *Apophthegmata Laconica*. Plato and Erasmus thought them worthy of study and their usefulness in the regulation of conduct and in the difficulties which confront us is as great to the wise man as to the simple. Aptly quoted they are a source of delight. Aptly applied they end a tedious discussion or clinch an argument. Their frequent repetition becomes tiresome, yet they come back to us with the familiarity of an old friend, as "If wishes were horses beggars would ride," though strangely the last part of the couplet is almost unknown, "If turnips were watches I'd wear one by my side." Their freshness is surprising. "One swallow makes not a spring, nor one woodcock a winter" is an ancient Greek adage which is current in at least sixty versions. "Nature has given us two ears, two eyes and but one tongue; to the end we should hear and see more than we speak" is attributed to Socrates and must have commended itself to Carlyle. Of national groups the Spanish is by far the greatest. A collection of thirty thousand found in the Heber library is accounted for by the ready wit of the people and the fitness of their language. "The lucky man has a daughter for his first-born" will be welcomed in some households, but "The lean dog is all fleas" is irritating. Italy gives us "You can't eat your cake and have your cake," which, travelling to Guernsey, becomes "He who eats his cream makes no butter." "Needs must whom the devil drives" appears as "Need will make an old woman, or wife, trot" in Guernsey and in Italy. "Horse, don't die yet, grass is coming," from France, must have been invented by an optimist. "What is play to the cat is death to the mouse" is Danish, and it is hard to better the cheery philosophy of the Scottish "I like a' things weel and guid things best," said Miss Wood of Elie." Some of the most beautiful are Arabic, Persian and Hindustani and nothing can exceed the exquisite poetry of the Turkish, "God makes a nest for the blind bird." A proverb may be a byword of reproach. In Scripture it is used as an utterance requiring interpretation. In a short drama a proverb serves as the basis of the

plot. In an extemporised play the proverb must be guessed by the audience.

Proverbs, BOOK OF, a canonical book of the Old Testament, the full title of which is "The Proverbs of Solomon." The Hebrew *mesal* (rendered by *paromia* in the Septuagint and *proverbium* in the Vulgate) differed from the ordinary "proverb" in that its most essential feature was not point or humour but the conveyance of religious and moral instruction. At first it probably presented in a terse and graphic manner some analogy between the physical world or man's social surroundings and the laws of his inner life (*cf.* Prov. xxv. 26, "A trampled fountain and a fouled spring is the righteous man who hath given way before the wicked"). In a later and more artificial age it became customary to throw each maxim into the form of a distich, which was frequently antithetic in character (*cf.* Prov. x. 1, "A wise son maketh a glad father, but a foolish son is the heaviness of his mother"). Like all collections of proverbs, the *mesal* were not the product of a single mind, but the gradual growth of ages. Internal evidence shows that the book comprises at least seven distinct portions, but it is impossible to determine with anything like certainty the comparative age of these or the circumstances of their composition.

Providence, the capital of Rhode Island, United States, stands at the head of navigation on Narragansett Bay, where the Seekonk (or Blackstone) falls into the narrow arm of the bay called Providence River, 44 miles S.W. of Boston. Founded by Roger Williams in 1638, it flourished first as a centre of foreign trade, but is now dependent chiefly on manufacturing industries, such as cotton- and wool-spinning, iron-founding, dyeing and bleaching, brewing, meat-packing and the manufacture of engines, tools and jewellery, the last being a speciality. The excellent harbour still commands a large coasting traffic. The State House dates from 1762 and the City Hall is one of the finest buildings in New England. Brown University, founded in 1764, is the chief educational institution and its senate is controlled by the Baptist body. It owns Ladd Observatory and the most complete collection of Americana in the world. Other prominent structures in the city are the Rhode Island School of Design, the new State House, the Athenæum, the Dexter Asylum for the poor, the Butler Hospital for the mentally afflicted, the Rhode Island Hospital, the First Baptist Meeting House (erected in 1775) and the Roman Catholic Cathedral, besides numerous schools. Roger Williams Park commemorates the founder and surrounds a large lake. Pop. (1900), 175,597.

Provincial, a religious superior who has the superintendence of all the brethren in a particular district known as a province.—The name Provincial was also applied to the inhabitants of the American Colonies before the Independence, particularly to the military contingents.—It may be noted that, though it is customary, in France as well as in English-speaking countries, to write of the

Provincial Letters (1656) of Blaise Pascal, produced in condemnation of the Jesuits, this is a misnomer, since the title of the work was *Lettres écrites . . . à un Provincial*.—A Provincial rose was a rose grown in Provins, in the department of Seine-et-Marne, and not in Provence.

Provins, a town of the department of Seine-et-Marne, France, at the confluence of the Durtain and Voulzie, 50 miles S.E. of Paris. In the Middle Ages it was a place of considerable importance under the Counts of Champagne, its fairs attracting traders from all parts of Europe. It was decimated by plague and famine in 1348 and 1349 and suffered repeatedly during the Hundred Years' War. Henri IV. captured it in 1592 after a fortnight's siege. The principal structures are the 12th-century church of St. Quiriace, the Hôtel de Ville, the Hôtel-Dieu and the Donjon, a huge quaint-looking keep, the base of which consists of a mound of masonry constructed by the English in the 15th century when they held the town. The cultivation of roses is the chief industry and the mineral waters (containing iron, lime and carbonic acid) are in repute. Pop. (1901), 8,794.

Provost, a title derived from the Latin *præpositus*, "placed at the head." Three main uses may be distinguished:—(1) In Austria, Bavaria, Prussia and England it denotes the head of a cathedral chapter of the Roman Catholic Church and the term is applied in the same way in the Episcopal Church of Scotland. In the Protestant Church of Germany it is used of the minister of a church to which other churches are subordinate. (2) The heads of Oriel, Queen's and Worcester colleges in Oxford University, of King's College in Cambridge University, and of Eton College bear the title. (3) The provost of a Scottish burgh corresponds to the English mayor, but the chief magistrate of Edinburgh, Glasgow, Perth, Aberdeen and Dundee is styled Lord Provost.

Provost-Marshal, in the Navy, is the officer having the custody of a prisoner during his trial by court-martial and he is responsible for his production whenever his presence is required by the court and until its sentence is executed. In the Army the provost-marshal is head of the police of any district or camp and is responsible for the preservation of order and for the punishment of all offences against military discipline. He has no authority to inflict punishment, but may arrest an offender and bring him before a court-martial and it will be his duty to see that the sentence is carried out. When troops are engaged in action he has to maintain discipline in the rear and to prevent irregularities occurring among the camp-followers and others.

Proxy, a substitute or deputy, or the legal instrument which empowers one person to act for another. By licence obtained from the King, peers could vote by proxy, but, as this special privilege was used as a reason for non-attendance in the House of Lords, the right was discontinued by a standing order, March 31st, 1868. The

privilege was not extended to the House of Commons, whose members are themselves proxies for the people. A shareholder in a joint-stock company may vote by proxy, the instrument requiring, by the Stamp Act of 1870, a penny stamp. A Deed of Procurator must bear a ten-shilling stamp. Princes, for reasons of state or convenience, were occasionally represented by deputy at their own marriage (Charles I. was married by proxy in Paris), but marriage by proxy is not recognised by the law of England.

Prudentius, AURELIUS CLEMENS, the Christian Latin poet, was born in 348 at some town in Spain. He adopted the profession of a lawyer and became a judge, afterwards holding a high court appointment at Rome, where he became tired of worldly affairs and, turning to religion, expressed his thought in several hymns; a poem on the divinity of Christ (*Apotheosis*); verses on the origin of evil and sin (*Hamartigenia*); a poem on the struggle for the soul between virtue and vice (*Psychomachia*); philosophical anti-pagan poems (*Contra Symmachum*); fourteen poems in honour of saints (*Peristephanon Liber*), usually considered his best work, and the *Diptychon*, a hexameter poem on Scriptural history. In his *Prefatio* he gives details of his life up to 405 and a catalogue of his works. The date of his death is unknown, but (as has been noted) he survived into the 5th century.

Prurigo, a skin affection in which there is a scattered eruption of slightly-raised pimples of the same colour as the skin, accompanied with incessant itching. It is due to stimulating food and drink, spices, heating exercise and even to change of temperature and the friction of clothing. The itching is often worst at bedtime and causes many a sleepless night, while bleeding and discharge may be set up by the constant scratching. The disease is much more troublesome in old people than in young folk. The back of the arms and legs are the favourite situation, but it may occur on the chest, lower part of the belly and the back. Itching without eruption of pimples or visible cause is known as *pruritus*. It is aggravated by errors of the table and "good" living. In treatment a self-denying diet must be strictly pursued, coffee and alcohol must be abandoned and highly seasoned dishes and shellfish must be tabooed. Cleanliness is essential and the use of Turkish baths may be beneficial. Internal remedies should only be resorted to under medical advice.

Prussia (German, *Preussen*; Latin, *Borussia*), a kingdom of Europe and the chief state of the German Empire, is bounded on the N. by the Baltic, Denmark and the North Sea, on the S. by Austria and Saxony, Bavaria, Hesse-Darmstadt and Alsace-Lorraine, on the E. by Russia and on the W. by Belgium, the Netherlands and Luxemburg. It has an area of 134,622 square miles, being for the most part level except in the neighbourhood of the Rhine and the Moselle, the central district of the Harz Mountains and the Saxon border-land. Besides the two rivers above-named, which drain

with their tributaries the western portion of the kingdom, there are also the Elbe, the Oder and the Niemen, whilst the Vistula receives some of the waters in the extreme east, where lakes are numerous. A characteristic feature of the Baltic seaboard is the succession of large lagoons separated from the open water by long spits of land and islands. The coast-line of 500 miles affords few good harbours—Königsberg, Danzig, Stettin, Swinemünde, Kiel and Hamburg, with the river-port of Bremen, being the principal. The soil on the whole is fertile, though there are large sandy tracts in the north and vast forests scattered over the central and eastern regions. Owing to the diversity of climates, the agricultural products are varied, the vine, maize, hops and fruits of all kinds being

of Deputies, elected by a system of indirect suffrage so devised as to give great weight to property, while the present distribution of seats tells strongly in favour of the landed interest. The sovereign, however, exercises very wide prerogatives and, by the constitution of the German Empire, is German Emperor. To the Bundesrat, or Federal Council, of the Empire Prussia sends seventeen members out of fifty-eight, and contributes 236 members to the Reichstag, or Diet of the Realm. The kingdom is divided for administrative purposes into fourteen provinces. Berlin is the capital, and among other important cities are Cologne, Frankfort-on-the-Main, Magdeburg, Breslau, Hanover, Elberfeld and Aachen. Primary education is compulsory and is carefully enforced and of its universities those of



SKETCH MAP OF PRUSSIA.

abundant in the south and west, whilst the colder districts yield rye, oats, wheat, barley, beets, potatoes, linseed, hemp and flax. Live-stock is reared on a vast scale, while poultry, dairy produce of every description and bee-keeping are of increasing importance. Coal and iron are worked successfully, and almost all metals except gold and silver exist in considerable quantity, whilst there are noted mineral springs at Homburg, Wiesbaden, Ems, Schlangenbad, Soden, Aachen, Salzbrunn and elsewhere. Manufactures of linen, cotton, woollen and silk goods flourish at various industrial centres and the iron and steel works rival those of Great Britain. Krupp's ordnance and armour-plating works at Essen are world-famous. Stettin ranks as one of the leading shipbuilding centres in Europe. Wine and beer are made in immense quantities and Berlin threatens the supremacy of Leipzig as a book mart. The government is a constitutional monarchy, with two legislative chambers (together called the Landtag)—namely, the Herrenhaus, answering to the House of Lords (but not wholly hereditary), and the Abgeordnetenhaus, or Chamber

of Deputies, elected by a system of indirect suffrage so devised as to give great weight to property, while the present distribution of seats tells strongly in favour of the landed interest. The sovereign, however, exercises very wide prerogatives and, by the constitution of the German Empire, is German Emperor. To the Bundesrat, or Federal Council, of the Empire Prussia sends seventeen members out of fifty-eight, and contributes 236 members to the Reichstag, or Diet of the Realm. The kingdom is divided for administrative purposes into fourteen provinces. Berlin is the capital, and among other important cities are Cologne, Frankfort-on-the-Main, Magdeburg, Breslau, Hanover, Elberfeld and Aachen. Primary education is compulsory and is carefully enforced and of its universities those of Berlin, Bonn, Breslau, Halle, Königsberg and Göttingen are in the highest repute. Religious liberty prevails, though legislation has occasionally been directed against Roman Catholics, who constitute a third of the population, the rest being Protestants, with a large Jewish element. The railway system is well developed, the lines being almost entirely owned by the State. The country derives its name from the Borussians, an extinct people, akin to the Lithuanians. The kings trace their origin to one of Charlemagne's generals, whose successor, Count Friedrich I., built the family castle of Hohenzollern, near the Danube, in 980. In 1415 Friedrich VI. was invested with the province of Brandenburg and two years later became Elector. During his long reign in the 17th century Friedrich Wilhelm, the Great Elector, largely increased his domains and his son, Friedrich I., crowned himself king at Königsberg on January 18th, 1701. Friedrich II. (the Great) enhanced the power of his house by his statesmanship and the second and third partitions of Poland added enormously to its territory. Pop. (1900), 34,472,509, or 256 to the square mile.

Prussians, OLD PRUSSIANS, or PRUCZI, the western division of the Lithuanians, who originally occupied the region between the Vistula and Niemen—that is, part of West and the whole of East Prussia. As a separate nationality these Prussians became extinct or absorbed in the surrounding German populations about 250 years ago. Of their Lithuanian dialect, which died out towards the middle of the 17th century, nothing survives except a vocabulary of over 800 words, dating from the beginning of the 15th century, and a translation of the German catechism published in 1561. Prussian was of more archaic type than Lettic and even preserved some forms older than those of Lithuanian itself.

Prussian Blue. When solutions of a ferric salt and yellow prussiate of potash are mixed together, a heavy dark-blue precipitate is formed known as Prussian blue, which is employed largely

as a pigment. Before being used for this purpose, the precipitate is washed well with water and a dilute acid. It has the composition represented by the formula $\text{Fe}_7(\text{CN})_{18}$, but its exact nature has yet to be determined. It dissolves readily in oxalic acid, yielding a liquid employed as a blue ink. A compound obtained from red prussiate and a ferrous salt is very similar if not identical and is known as Turnbull's blue.

Prussiate of Potash. Two salts are known as prussiates of potash—namely, the yellow prussiate and the red prussiate. The former of these is a salt of the composition $\text{K}_2\text{FeC}_6\text{N}_8$, which forms fine large yellow crystals soluble in water. It is obtained by heating organic nitrogenous matter, such as horns, hoofs, etc., together with crude potash and iron filings, and extracting the fused mass with water. It is important chemically, as it is the source from which prussic acid and almost all the cyanogen compounds are ultimately produced. Although classified as a poison in pharmacy, it is not poisonous. It may be readily recognised by the fact that it gives in solution a fine blue precipitate with ferric salts. It is employed medicinally to a slight extent, acting as a laxative. Red prussiate is obtained from the preceding compound by passing chlorine through its solution. It forms fine ruby-red crystals and has the composition represented by $\text{K}_3\text{FeC}_6\text{N}_8$. It is soluble in water, forming a brownish-green solution, which, with ferrous salts, yields a dark-blue precipitate. Besides its use in pure chemistry, it is employed for the production of a photographic paper used largely by engineers, etc., for giving tracing of line drawings.

Prussic Acid, or HYDROCYANIC ACID, consists chemically of hydrogen cyanide, HCN , and may be prepared by heating a metallic cyanide with an acid. It is also formed when an electric discharge is passed through a mixture of cyanogen and hydrogen or of acetylene and nitrogen. As in this latter case the acetylene can be produced by the direct union of its components, it follows that prussic acid can be formed by direct synthesis from its elements. The equation for this formation is $\text{C}_2\text{H}_2 + \text{N}_2 = 2\text{HCN}$. It is also produced by the fermentation of a certain vegetable product—amygdalin [GLUCOSIDE]—contained in laurel leaves, bitter almonds, cherry-stones and other sources. If pure, it is a colourless liquid which boils at 26.5°C . and may be solidified by cooling to -15°C . It has a specific gravity of about .7. It is inflammable, burning with a characteristic purple flame. Its odour if diluted is peculiar and irritating. It is soluble in water and most solvents. It is exceedingly poisonous. Nausea, convulsions and rapid insensibility are the usual symptoms. Chemical antidotes are of little avail, the only satisfactory treatment being the evacuation of the contents of the stomach, if that is possible, and the application of the cold douche to the neck and spine.

Fryne, WILLIAM, Puritan pamphleteer, was born at Swanswick, Somersetshire, England, in

1600 and was educated at Bath Grammar School and Oriel College, Oxford. He was called to the bar in 1628, but had already become known for his controversial and legal writings. In 1632 he published *Histrionastix* ("The Actor's Scourge"), reflecting on the immorality of the stage. For words contained in this supposed to refer to the queen he was degraded from his profession by the Star Chamber, fined, pilloried and deprived of his ears. For attacking the bishops in *News from Ipswich* (1637) he was condemned to imprisonment for life, being confined in Mount Orgueil Castle in Jersey for greater isolation, but both his sentences were declared illegal by the Long Parliament. Elected M.P. for Newport in Cornwall, he argued in favour of peace with the king and was accordingly "purged" by Pride (1648). For denouncing the Commonwealth he was imprisoned for three years. He was elected member for Bath in 1660 and after the Restoration was appointed Keeper of the Tower Records. He died in London on October 24th, 1669. His *Sovereign Power of Parliaments and Kingdoms* (1643) was deemed a conclusive vindication of the constitutional position of the Parliament. As a pamphleteer his industry was unflagging and his courage undaunted.

Psalmazar, GEORGE, literary impostor, whose real name has never been ascertained, was born probably in the south of France about 1680. After wandering about the Continent in various characters, he came to England in the early years of the 18th century. He pretended to be a Formosan and wrote a book on that country in 1704 and translated the Church Catechism into what was supposed to be that language. He was believed in by Henry Compton, Bishop of London, and Dr. Johnson, but was certainly a thorough impostor, though his own story was that William Innes, a Presbyterian chaplain to a Scots regiment lying at Sluys in 1702, encouraged him in his practice of deceit for their mutual profit. After the lapse of six years public opinion and most of his dupes were satisfied of his imposture and though he afterwards made a few feeble efforts to revive his false pretensions he finally abandoned them in 1728. Thenceforward he led the laborious life of a literary hack, but his genuine piety and irreproachable conduct earned him the respect of his neighbours. Dr. Johnson sometimes sought his company and never contradicted him. "He would," he said, "as soon have thought of contradicting a bishop." Psalmazar died in London on May 3rd, 1763, aged about 84.

Psalms, THE BOOK OF, one of the books of the Bible, containing 150 Psalms, many of which are traditionally attributed to David. Modern criticism, however, ascribes only from ten to twenty to David, and rejects the Mosaic authorship of the 90th Psalm and the Solomonic of the 72nd and 127th. A number are supposed to have been written at the time of the exile or later. Neither in the Book itself nor in the text of the Old Testament does any name for the Psalms collectively occur. The title given by the Jews is the Book of Praises, while in the Septuagint it is usually called *Biblos psalmōn*,

the *psalmos* being properly a song to the accompaniment of stringed instruments. In the Codex Alexandrinus the Book is named *Psalterion* (English, "Psalter"), which is, strictly, a stringed instrument. The 151st Psalm of the Septuagint is spurious.

Pseudaxonia, the order of Alcyonarian corals, of which the "red coral" of commerce (*Corallium rubrum*) is the best-known representative. The order is characterised by the presence of a rod-like, branching skeleton, which is surrounded by the fleshy parts of the animals which compose the colony. The skeleton is therefore said to be sclerobasic: it consists in *Corallium* of fused calcareous spicules; in other groups these spicules are less abundant and occur either scattered through a horny axis (as in the *Sclerogorgiacea*), or the skeleton consists of joints formed of spicules alternating with others formed of horny material (as in *Melithæa*). The oldest representatives of the order are some Jurassic species of *Corallium*.

Pseudocoel, the name applied to the functional body cavity in the higher animals: it is so called because it is due to the formation of spaces in the tissues and is not connected with the primitive cavity in the embryo.

Pseudomorphs are minerals occurring in forms characteristic of some other species. They have generally rounded angles and dull surfaces. Pseudomorphs may be grouped, according to their mode of origin, into four classes:—

1. Encrustation pseudomorphs, or epimorphs, where one mineral encrusts another, which is subsequently dissolved and may be replaced.

2. Alteration pseudomorphs, formed by gradual chemical change. They arise either (1) from loss of a constituent (katogenic), as copper from cuprite (CuO); or (2) from gain of a constituent (anogenic), as malachite ($\text{CuCO}_3 + \text{CuH}_2\text{O}_2$) from cuprite, or anglesite (PbSO_4) from galena (PbS); or (3) from exchange of constituents, as galena from pyromorphite ($3\text{Pb}_3\text{P}_2\text{O}_8 + \text{PbCl}$).

3. Replacement or Substitution pseudomorphs, where one substance is removed and an altogether distinct substance substituted for it, as hematite (Fe_2O_3) for calcite (CaCO_3).

4. Paramorphic pseudomorphs, or paramorphs, where one dimorphic condition of a chemical substance replaces another, *i.e.*, where the molecules have been rearranged without change of composition, as calcite from aragonite.

Fossils may be considered as calcite, opal, fluor, marcasite, or other mineral, pseudomorphous after animal or vegetable matter. Pseudomorphism, having often occurred on a large scale, is of the utmost importance in the study of rocks.

Pseudonym, also *NOM DE GUERRE* and, incorrectly, *NOM DE PLUME* or *PEN-NAME*, a name assumed for various reasons (the most obvious being also the most probable) by a writer or other person desirous of making a more or less public appearance under what is practically a form of anonymity. Though pseudonyms are most commonly employed

by authors, their use is by no means confined to literary persons. Actors and actresses, notoriously, are given to veiling their identity under stage-names. The permanent adoption of a name other than the family name, however, is, strictly speaking, not a pseudonym. Thus (Sir) Henry Irving was not a pseudonym for John Henry Brodribb which was his real name, and the innumerable Smiths who, in dislike of the sweet simplicity of one of the oldest and most honourable names, affect to spell it "Smythe" do not thereby adopt a pseudonym. The German Reformers were prone to the Hellenising of their names and not one person in ten thousand probably knows or remembers that Melancthon's original name was Schwarzert and that of Ecolampadius Heussgen. Examples of change of name are also frequent among painters, as in the well-known instances of Claude Lorrain, whose name was Claude Gellée, and Gaspar Poussin, whose name was Gaspar Dughet. Nor is a sobriquet properly a pseudonym: thus "Perdita" would not be recognised as the pseudonym of Mary Robinson (1758–1800), the actress who used it, nor "Saccharissa" of Dorothy Spencer, Countess of Sunderland, who was so addressed by Edmund Waller the poet. The following is a list of the pseudonyms that have been employed by authors of more or less celebrity:—

A.K.H.B.	...	Rev. Dr. A. K. H. Boyd.
A.L.O.E. (<i>A Lady of England</i>)	...	Charlotte Maria Tucker.
Abbott, Angus Evan	...	James Barr.
Adeler, Max	...	Charles Heber Clark.
Alcibades	...	Lord Tennyson in <i>Punch</i> , 1846.
Alofibras Nasier	...	François Rabalais.
Alexander, Mrs.	...	Mrs. A. F. Hector.
Amateur Casual	...	James Greenwood.
Amyard, Arthur	...	Major Edward Arthur Haggard.
Anstey, F.	...	F. Anstey Guthrie.
Ape (in " <i>Vanity Fair</i> ")	...	Carlo Pellegrini.
Artist Unknown	...	Joseph Pennell.
Atlas (in " <i>The World</i> ")	...	Edmund Yates.
Aunt Judy	...	Mrs. Alfred Gatty.
Bab	...	W. S. Gilbert.
Bede, Cuthbert	...	Rev. E. Brailley.
Bell, Acton	...	Anne Bronte.
" Currer	...	Charlotte Brontë.
" Ellis	...	Emily Jane Brontë.
Berwick, Mary	...	Adelaide Anne Procter.
Bettina	...	Elizabeth von Arnim.
Bibliophile Jacob	...	Paul Lacroix.
Bickerstaff, Isaac	...	Dean Swift and Steele in <i>Tatler</i> .
Biggerstaff Bros.	...	W. Nicholson and J. Pryde.
Biglow, Hosea	...	J. Russell Lowell.
Billings, Josh	...	Henry W. Shaw.
Bogan of Bogan, Mrs.	...	Baroness Nairne.
Boldrewood, Rolf	...	T. A. Browne.
Bon Gaultier	...	Sir Theodore Martin and W. E. Aytoun.
Bos	...	Charles Dickens.
Breitmann, Hans	...	Charles G. Leland.
Brown, Mrs.	...	George Rose.
Browne, Matthew	...	W. B. Rands.
Browne, Phillis	...	Mrs. Hamer.
Bytkin, Ivan	...	Alexander Pushkin.
Bylander	...	Goldwin Smith.
C.S.C.	...	C. S. Calverley.
Caballero, Fernon	...	Cecilia Bohl von Faber.
Carmen Sulea	...	Queen of Rumania.
Carroll, Lewis	...	C. L. Dodgson.
Cavendish	...	H. Jones.
Caxton, Pisistratus	...	1st Lord Lytton.
Cham	...	Amédée de Noé.
Claribel	...	Mrs. Barnard.
Conway, Hugh	...	F. J. Fergus.
Corno di Bassetto	...	George Bernard Shaw.

Cornwall, Barry ... B. W. Procter.
 Country Parson ... (Dr. A. K. H. Boyd.
 Crayon, Christopher ... { Rev. H. Moule.
 Crayon, Geoffrey ... J. E. Ritchie.
 Crowquill, Alfred ... Washington Irving.
 Dagonet ... A. H. Forrester (artist) and
 C. B. Forrester (author).
 Dandbury Newsman ... G. R. Sims.
 Danby, Frank ... J. M. Bailey.
 D'Auvers, N. ... Mrs. Frankau.
 Dash, Comtesse ... Mrs. A. G. Bell.
 Delorme, Joseph ... M. de Sainte-Mars.
 Delta ... C. A. Sainte-Beuve.
 Dots, Meg ... D. M. Moir.
 E.V.B. ... Mrs. Johnstone.
 Egerton, George ... Hon. Mrs. Boyle.
 Elia ... Mrs. Golding Bright.
 Eliot, George ... Charles Lamb.
 Ettrick Shepherd ... Mrs. Cross (née Marian Evans).
 Fairleigh, Frank ... James Hogg.
 Farningham, Marianne ... Francis E. Smedley.
 Fern, Fanny ... Mrs. Sarah P. Parton.
 Filomena ... Mrs. Ponwick Millar.
 Garrett, Edward ... Mrs. I. Fyvie Mayo.
 Germain ... Pasquier Quesnel.
 Gift, Theo ... Theodora Boulger.
 Gothelf, Jeremias ... A. Bitzins.
 Graduate of Oxford ... John Ruskin.
 Graham, Eunis ... Mrs. Molesworth.
 Gray, Maxwell ... Miss M. G. Tuttiott.
 Greenwood, Grace ... Mrs. Lippincott.
 Griville, Henry ... Mme. Durand.
 Gyp ... Comtesse de Martel de Janville.
 H.B. ... John Doyle.
 H.H. ... Mrs. Helen Hunt Jackson.
 Haliburton, Hugh ... J. L. Robertson.
 Hamilton, Gail ... Mary Abigail Dodge.
 Hamst, Olphur ... Ralph Thomas.
 Harland, Marian ... Mrs. M. V. Terhune (née Hawes).
 Hildebrand ... N. Beets.
 Hippolytus a Lapide ... Philipp Bogislav von Chemnitz.
 Historicus ... Sir W. Vernon Harcourt.
 Hobbes, John Oliver ... Mrs. Craigie.
 Holbeach, Henry ... W. B. Rands.
 Holland, Elizabeth ... Miss Thomas.
 Hope, Anthony ... A. H. Hawkins.
 Hope, Ascott R. ... Robert Hope Moncrieff.
 Hope, F. T. L. ... Duane Farrar.
 Hyperion ... Josiah Quincy.
 Iconoclast ... { Charles Bradlaugh.
 { J. F. McLennan.
 Impenitent, The ... H. D. Lowry.
 Ingoldsby, Thomas ... Rev. R. H. Barham.
 Iota ... Mrs. Mannington Caffyn.
 Iron, Ralph ... Olive Schreiner.
 Janus ... Döllinger, Huber and Fried-
 rich.
 Jean Paul ... J. P. F. Richter.
 Junius ... (O) Sir Philip Francis.
 Kafa Phasin ... John Ruskin.
 Kerr, Opheus C. ... R. H. Newell.
 King, Alir ... Alice Kennedy.
 Knickerbocker, Dietrich ... Washington Irving.
 L.E.L. ... Letitia E. Landon.
 La Roche, John ... Oswald Crawford.
 Lee, Holme ... Harriet Parr.
 Lee, Vernon ... Violet Paget.
 Lenaw, N. ... N. Niembach von Strehlenau.
 Levent, Fanny ... Mme. Stahr.
 L'Anver, Luke ... John Leighton.
 Little, Thomas ... T. Moore.
 Lorrain, Jean ... Nicolas Elme Restif de la
 Bretonne.
 Loti, Pierre ... Julien Viaud.
 Ludlow, Johnny ... Mrs. Henry Wood.
 Lyall, Edna ... Ada Ellen Bayly.
 Macleod, Fiona ... William Sharp.
 Madge ... Mrs. Humphrey.
 MacDonald, Thomas ... R. Buchanan.
 Malakoff ... W. E. Johnston.
 Malet, Lucas ... Mrs. St. Leger Harrison (née
 Kingsley).
 Malvery, Olive Christian ... Mrs. Archibald Mackirdy.

Markham, Mrs. ... Mrs. E. C. Penrose.
 Marlitt, E. ... Henrietta Eugenia John.
 Mathers, Helen ... Mrs. Reeves (née Matthews).
 Meade, L. T. ... Mrs. Toulmin-Smith.
 Meredith, Isabel ... Olivia and Helen Rossetti.
 Meredith, Owen ... Earl of Lytton.
 Merlin ... Alfred Tennyson in *Examiner*,
 1852.
 Miller, Joaquin ... Cincinnati H. Miller.
 Montalte, Louis de ... Blaise Pascal.
 Monzombano, Sereninus de ... Samuel Puffendorf.
 Muttali ... E. Douwes Dekker.
 Nasby, Petroleum V. ... D. R. Locke.
 Nervul, Gerard de ... G. Labrunie.
 Nimrod ... C. J. Apperley.
 North, Christopher ... Prof. John Wilson.
 Nostradamus ... Michel de Notre-dame.
 Noralis ... F. L. von Hardenberg.
 O.K. ... Mme. de Novikoff (née Olga
 Kirell).
 O'Donovan, P. M. ... T. L. Pracock.
 O'Dowd, Cornelius ... Charles Lever.
 Ogilby, Gavin ... J. M. Barrie.
 Old Humphrey ... G. Mogridge.
 Old Merry ... Edwin Hodder.
 Omnium, Jacob ... M. J. Higgins.
 Opium-Eater ... T. de Quincey.
 Optic, Oliver ... W. T. Adams.
 O'Kell, Max ... Paul Blouet.
 Orinda ... Katherine Phillips.
 Onida ... Louise de la Ramée.
 Page, H. A. ... Alex. H. Jupp.
 { S. G. Goodrich ;
 { W. Martin ;
 { G. Mogridge ;
 { W. Tegg ; J. Bennett.
 Parley, Peter ... M. J. Higgins.
 Paterfamilias ... T. Byerley.
 Percy, Reuben ... J. C. Robertson.
 Percy, Sholto ... Hablot K. Browne.
 Phiz ... John Wileot.
 Pindar, Peter ... Sydney Smith.
 Plymley, Peter ... F. S. Mahony.
 Prout, Father ... { Douglas Jerrold.
 { A. T. Quiller-Couch.
 Q. ... Dr. Döllinger.
 Quirinus ... Wm. Senior.
 Red Spinner ... Mrs. D. Humphreys.
 Rita ... Mrs. J. R. Seeley.
 Robertson, John ... Sir J. R. Seeley.
 Rob Roy ... John McGregor.
 Ross, Adrian ... A. R. Boyce.
 Roving Englishman ... Rev. Lord Stanley Godolphin
 S.G.O. ... Osborne.
 Saint Rémy ... Due de Morny.
 Sand, George ... Mme. Dudoant (née Dupin).
 Scott, Leander ... Mrs. Lucy E. Baxter.
 Scribnerus, Martinus ... Swift, Pope, and Arbuthnot.
 Seabfield, Charles ... K. A. Postel.
 Selkirk, J. B. ... J. B. Brown.
 Setous, Gabriel ... T. N. Hepburn.
 Sharpe, Luke ... Robt. Barr.
 Shirley ... John Skelton.
 Sketchley, Arthur ... Rev. George Rose.
 Stick, Sam ... T. C. Haliburton.
 Spy ... Leslie Ward.
 Sickedrin ... M. Solykoff.
 Stendhal ... Marie Henri Beyle.
 Stepniak ... S. M. Krachvinsky.
 Stern, Daniel ... Comtesse d'Agoult.
 Stonehenge ... J. H. Walsh.
 Stretton, Hesba ... Sarah Smith.
 Surfaceman ... Alex. Anderson.
 Swan, Annie S. ... Mrs. Burnett Smith.
 Syntax, Dr. ... W. Combe.
 Taley ... T. A. L. von Jacob-Robinson.
 Taylor, G. ... Prof. Hausrath.
 T[ay] T[ay] ... T. P. O'Connor.
 Timon ... Lord Lytton.
 Titcomb, Timothy ... J. G. Holland.
 Titmarsh, Michael Angelo ... W. M. Thackeray.
 Toby, M.P. ... H. W. Lucy.
 Turner, Ethel ... Mrs. H. R. Curlewis.
 Twain, Mark ... S. L. Clemens.

<i>Tytler, Sarah</i> ...	Miss H. Keldie.
<i>Uncle Remus</i> ...	Joel Chandler Harris.
<i>Urban, Sylvanus</i> ...	Editor <i>Gentleman's Magazine</i> .
<i>Vacuus Viator</i> ...	Thomas Hughes.
<i>Verax</i> ...	H. Duckley.
<i>Vollorte</i> ...	François Marie Aronet.
<i>Ward, Artemus</i> ...	C. F. Brown.
<i>Werden, Florence</i> ...	Mrs. G. James.
<i>Wetherell, Elizabeth</i> ...	Susan Warner.
<i>Winter, John Strange</i> ...	Mrs. Arthur Stannard.
<i>Zadkiel</i> ...	Capt. R. J. Morrison, R.N.

Pseudopodia, the blunt, thick, irregular processes from the protoplasm which forms the body substance of many Protozoa, especially those belonging to the Rhizopoda.

Pseudoscorpionidae, a group of Arachnida which have a long, clawed pair of appendages arising from the head, which give them somewhat the aspect of small scorpions. The abdomen, however, is very different, as in these it is broad and flat throughout and has no narrow posterior part (metasoma). Few of these creatures exceed one-sixth of an inch in length and they are pretty numerous in most countries. They lead a concealed life, penetrating into hidden spaces in search of shelter and food. One of the best known, the Book Scorpion (*Chelifer cancrroides*), about one-eighth of an inch long, lives among old dusty books and portfolios. Allied species occur in moss, hot-beds and among decaying vegetable matter, on the ground among herbage and under the loose bark of trees. They run freely and hold up their tiny pincers threateningly when alarmed. They feed on mites and minute insects. The females are oviparous, usually producing about twenty eggs. Some species fasten on with their pincers to flies, which may sometimes be seen thus burdened.

Pshav, a Caucasian people forming a distinct branch of the Georgian family, whose territory comprises the upland valleys of the Aragva river and some of the head-waters of the Kûr, in the government of Tiflis. The Pshavs, whose numbers do not exceed 7,000, are still a half-savage people, living in small tribal or family groups, holding their lands in common, preserving traces of the old matriarchal system, speaking an archaic form of Georgian and, although nominally Christians, addicted to many pagan practices.

Pskov, a government of Russia, bounded on the N. by St. Petersburg, on the E. by Novgorod, Tver and Suolensk, on the S. by Vitebsk and on the W. by Livonia. It has an area of 17,000 square miles, is watered by the Velikaya, Lovat, Shelon, Polist and other streams, contains numerous lakes, mostly small, and many marshy tracts and, saving in the hilly south, is flat or undulating. The forests are extensive, yielding much timber and, though the soil is unfertile, rye, oats, barley and potatoes are grown. The fisheries are productive, but the manufactures are insignificant. The capital is Pskov. Pop., 1,136,540.

Pskov, capital of the preceding province, situated at the confluence of the Velikaya and Pskova, 162 miles S.W. of St. Petersburg. It is one of the

oldest towns in Russia, maintaining its independence until the 16th century, being the last to pass under the yoke of Moscow. The most interesting building is the 12th-century cathedral in the Kremlin containing tombs of the mediæval princes and bishops of Pskov. There is trade in flax and other products. Pop., 30,400.

Psocids, a family of Pseudoneuroptera, small insects with simply-veined wings, the hind pair considerably smaller than the fore. They frequent the trunks of trees, old palings, walls and situations where lichens and mosses flourish. Low forms of vegetation and animals still more minute than themselves constitute their food. They occur chiefly in the temperate regions of the Old World. Besides the winged species of *Psocus*, the family includes wingless forms, usually about $\frac{1}{2}$ of an inch in length, which live among old books and papers, whence they are known as Book Lice. They are also among the mites that play havoc with collections of insects and dried plants. The most familiar species is called *Atropus pulsatorius*, the specific name referring to an old belief that this feeble little thing was the Death-watch.

Psoriasis, a skin affection in which congested areas, which subsequently assume a scaly form of desquamation, develop on the skin. The eruption usually appears on the back of the arm or the front of the legs, but may affect other parts of the body. It is apt to recur. General treatment includes close attention to the health and digestion, besides the avoidance of friction from the clothing. A warm equable climate is beneficial and sea-bathing is often curative. Arsenic is about the only drug upon which reliance can be placed. Local treatment begins by removal of the scales with hot water and soft soap. When the affection is acute and there is redness round the spots, zinc or boracic acid should be used and, in chronic cases, the ointment of chrysophanic acid, which, however, must be employed under safeguards which must be ascertained beforehand.

Psyche, the heroine of a Greek myth dealing with the love of the soul (*psuchê*), was beloved by Eros (Cupid). They only met at night and the mortal maiden was warned by the god not to try to discover who he was. At last, however, curiosity got the better of her and she lit a lamp and looked at him while asleep. Eros, awaked by a drop of hot oil which fell on him, immediately vanished and it was not till after long wanderings that Psyche was again united to the god in the palace of Aphrodite, where the jealous Queen of Love had kept her for a time in slavery. From being the personification of the soul or spirit, Psyche came in time to typify the human soul or mind. She was sometimes represented with the wings of a butterfly and the butterfly was her symbol, less because it is fickle and changeable than because it is light, airy, beautiful and almost intangible.

Psychids, a family of moths in which the females are wingless and limbless and never quit the tubes formed by the larvæ. The males

expand an inch or less, their wings being uniformly blackish or whitish and rounded at the extremities. They fly in grassy places by day.

Psychology. Psychology may be defined as the science of mind. It properly denotes that part of philosophy which deals with the soul (Greek, *psychē*); but the soul is a mysterious entity, the nature of which eludes scientific inquiry. The old "rational" psychology started with the assumption that mind is a peculiar property of the individual and was thus hampered at the outset with associations inseparable from the empirical Ego. For "empirical" or "experimental" psychology, on the other hand, mind is merely a congeries of complex phenomena and the idea of personality is itself a mental phenomenon, the origin of which requires explanation. Psychology claims to be a science because, in tracing the development of mental life, it proceeds on the same assumptions and makes use of the same methods as the physical sciences. When it abandons observation and experiment and falls back on *à priori* reasoning, it loses its scientific character. A more exact notion of its scope may be gained by distinguishing it from the "disciplines," to which, on one side or another, it has the closest affinity. (1) Metaphysic seeks to evolve the whole system of the universe from some groundwork or fundamental principle beyond the reach of experience proper. Psychology, on the other hand, makes no attempt to pass beyond the limits of experience. In the language of philosophy, metaphysic is concerned with mind in its "noumenal," psychology in its "phenomenal" aspect. (2) Logic discusses the validity of mental processes—shows the principles to which they must conform if their results are to hold good for all minds in a normal condition. But psychology confines its attention to the mental processes themselves. (3) Physiology treats of the animal organism, including those bodily functions which are closely associated with mental activity. The line between the two is, however, very sharply drawn, so that it is impossible to interpret the one in terms of the other, or even to establish a causal relation between them. Yet the interaction of mind and body as mutual cause and effect is supposed to be a matter of common experience and it is assumed in psychology as the most convenient working hypothesis.

The only valid distinction between mental and physical phenomena is that the latter are cognised as existing in space, whereas the spatial element is absent from mind, or exists only in the form of represented extension. But space-relations are involved in all objective truth, so that in a sphere where the conception is precluded, each individual would seem to be confined to his own experience. If the mental phenomena themselves furnished the sole clue for ascertaining the laws by which they are regulated, psychological inquiry would indeed be limited to the examination of our own minds; but we know that every form of mental activity has its physical counterpart in certain bodily changes. Ordinary observation supplies rough generalisations regarding the workings of other

minds and by means of the data furnished by physiology these can be reduced to a scientific form. From physiology we learn that we have a nervous system consisting of a central mass composed of the brain and spinal cord and a multitude of afferent (incarrying) and efferent (outcarrying) nerves, which convey activity to and from the central portion respectively. We know further that each of the five "special" senses has its own system of afferent and efferent nerves, connected at the extremity farthest from the brain with an external sense-organ, through which the brain communicates with the outer world. A sensation is preceded by a stimulation of the peripheral surface of a nerve and in the more complex of the "nerve-centres," where a multitude of nerves unite, a co-ordination of sensations is supposed to take place, resulting in higher forms of thought. The fact that the efferent nerves, which control the muscles, act in harmony with the afferent nerves is important in connection with the development of the will. It will thus be seen that psychology rests on a twofold foundation—introspection and physiological inquiry.

Mind embraces the emotional and active as well as the intellectual portions of consciousness. The old psychology accepted the popular fallacy that man is endowed with "faculties," usually distinguished as intellect, feeling and will. But these "faculties" must be reckoned among the fictions which the mind naturally creates in its endeavour to render the universe more intelligible. Assumptions regarding the subjective basis of mind are out of place in science and, moreover, in the simplest act of consciousness discrimination (which is thought), feeling and the impulse to act are inextricably woven together. Nevertheless, the distinction between the three classes of mental phenomena is useful or rather essential; it is based on a real difference of which the mind is conscious and some preliminary abstraction and classification are indispensable. The analysis of mental states into elements which never actually occur in isolation may be carried much farther in each of the three spheres. The primary distinction here made is that between Presentation and Representation. Presentation may be said to give us sensations; Representation, images or ideas, but in fact even an apparently simple sensation contains representative elements. A presentation is an immediate fact of consciousness, the genesis of which is attributed to external agencies and not to a mental process, voluntary or involuntary, of the subject. The measure of each person's control over his own presentations need not be discussed here; it is sufficient to observe that the feeling of "reality" attaching to them always rests on the belief that they are forced in upon our minds from some external source. On the other hand, the dim and blurred copy of a presentation called a representation arises in our minds in connection with our own past or anticipated experience. Sensation, perception, conception, judgment, reasoning, form a scale in which presentation soon disappears and the representative elements become more numerous and complex. A percept is a group of (presented

and represented) sensations which are supposed to correspond to so many "qualities" or "attributes" inherent in some external object or substance; an unsophisticated person might call it an immediate mental reproduction of the object, but this notion cannot, of course, be justified on philosophic grounds. A concept is an image with properties common to several percepts or ideas, each of which has attributes not contained in the concept. In language concepts are represented by common and abstract names. A judgment is a comparison of percepts or concepts, or of a percept with a concept; its equivalent in language is the proposition. Apparently there is no difference in kind between a judgment and an intuition of sense, the only distinction being that in the former higher forms of thought are brought together and the self-conscious element is more distinctly present. A train of reasoning, the simplest example of which is the syllogism, is a complex process in which several judgments combine so as to form a new judgment. In like manner feelings are classified according to the degree of their complexity and mind on its active side is traced through many stages from reflex action to a sustained tension of the will manifested in a complicated series of actions directed towards some common end.

Our survey has hitherto been static rather than dynamical; it will now be well to look more closely into the mechanism of mind, especially on the intellectual side. The attitude of the subject engaged in building up the fabric of its own experience is called Attention. Our consciousness at any moment consists of a vaguely-diffused mass, portions of which present themselves with great distinctness while others are but dimly realised. Before any portion of this fleeting consciousness can become a permanent mental possession, it must acquire a certain degree of precision and clearness, so as to be—at least in appearance—separable from the adjoining mass. We are then said to attend to it. Whatever an act of attention may be in itself—whether it be a modification of nerve centres or a step in the realisation of the Ego—its importance for psychology is that it involves a consciousness either of the difference or the similarity of two phenomena (or rather, in all actual acts of attention, of both together). To this intuition need only be added the power of retaining or recalling impressions (ideation or representation) and the mind will be furnished with all that it needs for carrying out the most recalcitrant and most complex processes. A sensation must be discriminated from others before it can be recalled; attention to the features common to several percepts is necessary for the concept; to judge and to reason are only to detect points of resemblance and diversity on a more extended scale. The most plausible view of ideation seems to be that the mind does not entirely lose its forgotten impressions; they continue to form part of its integral substance, but sink below the level of consciousness to a "sub-conscious" region, from which they may be recalled by some favourable train of thought. This view gives a new meaning to the "Laws of Association" formulated by the first English scientific psychologists. Of

these the most important was the Law of Contiguity, according to which any mental experience has the power of reviving another with which it has been frequently conjoined. The sight of a lump of sugar will probably recall the idea of a sweet taste. Those psychologists who take a purely physical view of mind hold that the recurrence of an impression in the form of an idea is due merely to the irritation of the nerve region originally affected. Psychologists frequently disclaim any metaphysical bias, but it must be admitted that their explanations are usually more in accordance with empirical than with *a priori* views. This is well illustrated in the account commonly given of the processes involved in perception. The attribute of resistance, which is one of the chief elements in our notion of matter, is derived from the muscular feeling of expended energy. In like manner the notion of extension or space and the localisation of objects therein are traced to a complicated series of movements (involving muscular activity) accompanied by sensations of touch. Every school would acknowledge that there is a basis of truth in this exposition, but that does not necessarily involve assent to the manner in which it is put forward.

Whatever progress psychology may make, it is probable that a vast field of mental activity will always lie outside the range of experiment and external observation. In this region introspection must remain the only method of discovering mental laws. In so far as the theories of psychologists are found to tally with everyone's inner experience, they certainly acquire some degree of objective validity. But we are here confronted with a further difficulty. The mind turned inwards upon itself can never gain a complete survey of its own contents; in the very act of observing his present condition the thinker introduces a new and disturbing force and, whatever efforts he may make to eliminate the personal factor, self-consciousness must always remain an unresolved element in the background. For this reason, among others, psychologists are disposed to abandon the introspective field and seek for the verification and amplification of the laws already formulated concerning mental action in an enlarged study of its physical accompaniments. To the "psycho-physical" experiments of Weber, Fechner and Wundt, as well as others of more recent date in the United States and Canada, we are indebted for much interesting information regarding the workings of the mind. An important class of experiments is that relating to reaction-time, *i.e.*, the time which passes before muscular activity manifests itself in response to a sense-stimulus. Very precise results have been obtained, the time, of course, varying with personal differences and the complexity of the processes involved.

Psychrometer is another name for Mason's wet and dry bulb hygrometer and is an instrument for measuring the tension of aqueous vapour in the air.

Ptarmigan (*Lagopus*), a genus of game birds of the Grouse family, having the legs feathered to the toes. There are several species, natives of the

northern parts of both hemispheres. In winter, with one exception (the Red Grouse), they assume white plumage. The Common Ptarmigan (*L. mutus*) is found in North and Central Scotland, the Orkneys and the Hebrides and in the mountainous parts of Northern Europe. The male is about fifteen inches long; the summer dress is greyish-brown; the head, shoulders and breast being blackish, while the under surface and wings are white. When danger threatens or the birds get alarmed, they squat motionless on the ground and so closely does their plumage harmonise at any season with their surroundings that, Dr. Dresser says, "one may walk through a covey without being aware of the close proximity of a single individual." The old birds eat alpine berries, seeds and young shoots, but the young ones are fed chiefly on insects. The flesh of Ptarmigan is much esteemed for the table.



PTARMIGAN
(*Lagopus mutus*).

Pteridophyta (formerly termed Vascular Cryptogams), a sub-kingdom of plants including three classes, the Filicinæ, Equisetinæ and Lycopodiinæ, i.e., ferns, horsetails and club-mosses. They have a well-marked alternation of generations, the sporophyte being the more conspicuous stage. It is generally differentiated into root, stem and leaf and contains vascular tissue. It is formed from the oospore, but part of the embryo forms an embryonic absorbent organ, the foot or suspensor. The primary root, if present, does not persist. The stem is generally short and unbranched in Filicinæ; elongated and much branched in the other classes. The leaves are relatively large and commonly act also as sporophylls in Filicinæ; they are minute and of two distinct kinds, foliage-leaves and sporophylls, in the other classes. Root, stem and leaf have usually an apical cell in Filicinæ and Equisetinæ, but a group of apical meristem in Lycopodiinæ. The vascular bundles are generally closed and scalariform thickening is characteristic. Important classificatory characters are the spores being all alike (homosporous), or male and female (heterosporous), and the sporangium originating from one cell (leptosporangiate), or from a group (eusporangiate). The gametophyte or prothallium in the homosporous groups generally bears both antheridia and archegonia. The former on bursting liberate spiral antherozoids, with many cilia in

Filicinæ and Equisetinæ, but with two only in Lycopodiinæ. These swim about in drops of rain or dew until they are attracted to the short-necked archegonia by an excretion of malic acid. Among ferns, both apogamy and apospory occur, thus destroying any strict alternation of generations. Professor Vines's classification is as follows:—

Class—FILICINÆ.

Sub-Class—*Homosporææ*.

Section—Eusporangiatæ.

Order—Ophioglossacææ.

" Marattiacææ.

Section—Leptosporangiatæ.

Most ferns.

Sub-Class—*Heterosporææ*.

Section—Eusporangiatæ.

Order—Isoetacææ.

Section—Leptosporangiatæ.

Order—Salviniaacææ.

" Marsileaacææ.

Class—EQUISETINÆ.

Order—Equisetacææ.

Class—LYCOPODINÆ.

Sub-Class—*Homosporææ*.

Order—Lycopodiaceæ, etc.

Sub-Class—*Heterosporææ*.

Order—Selaginellacææ.

Pterobranchia, a group of animals closely allied to the Bryozoa, but the exact systematic value of which is uncertain. It is, however, probably most closely associated with the Entoprocta. Only two genera are known and these are very different in structure and habit. The better known is *Rhabdopleura*, which has been dredged off the coasts of Norway and Scotland in from ten fathoms to three hundred, and *Cephalodiscus*, which lives in the seas of Patagonia. The former occurs as branching colonies, but the latter is simple. Their affinities to the Bryozoa are shown by the possession of an epistome and the flexure of the intestine.

Pterodactyl, the general name applied to all the winged reptiles of the Secondary rocks. Fourteen genera, including 86 species, are now recognised, varying in size from that of a sparrow to that of an albatross. They had in most cases teeth, but sometimes also a horny beak; a more

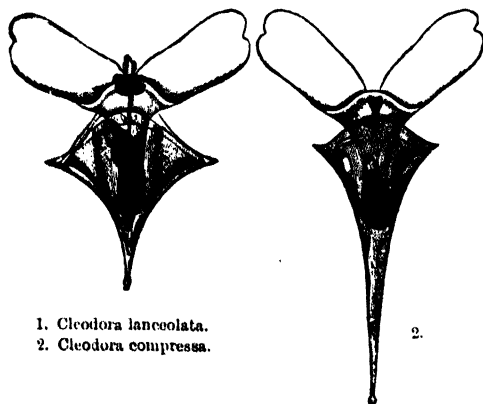


SKELTON OF PTERODACTYL.

or less elongated lizard-like tail and an enormously elongated outer digit or wing-finger to the forelimbs. This supported an expansion of the integument, resembling that in the bats, which may have extended to the hind-limbs and tail. There is no probability of their having had feathers. The pterodactyls range in geological time from the

Trias to the Upper Chalk. Many large forms have been found in the Cretaceous rocks of Kansas; but the longest-known and best-preserved are from the Solnhofen lithographic stone of Bavaria, Kimmeridgian in age.

Pteropoda, popularly called "Wing Shells," a class of Mollusca which live in great numbers at the surface of the ocean far from land in all parts of the world, in Arctic waters as well as in Equatorial seas. They have heads and thus belong to the branch of Mollusca known as Glossophora. They are bilaterally symmetrical and accordingly have been regarded as allied to the Cephalopoda; thus Professor Ray Lankester groups them as the Siphonophora, but there is little doubt that this bilateral symmetry has been reacquired, while it is probable that the lateral wing-like processes (or epipodia) are not homologous with the arms of the Cephalopoda. The larvæ are always provided with a shell, but in the adult state only those belonging to the order Thecosomata possess one. This, however, does not represent the larval shell, but one secondarily acquired by all Pteropods; both shells are thrown off in the order Gymnosomata and one family of the other order, namely, the Cymbulidæ, in which a third shell is formed; both remain in Styliola and the larval shell only in the family Hyaleidæ. The Pteropods are small animals and are usually found only at some distance from land, but they have been found on the Scottish coast, as in St. Andrews Bay; they occur in such enormous shoals (actually discolouring the sea-surface in patches many square miles in area) that, in spite of their small size, they form a leading article in the food of whales and sea-birds. The Greenland whale strains them out of the water as it passes through its mouth with its whalebone sieve. There are two



1. *Cleodora lanceolata*.
2. *Cleodora compressa*.

PTEROPODA.

orders—the Thecosomata, the members of which, as we have seen, have a shell, and the Gymnosomata, in which they are shell-less. The group is one of great antiquity, though much doubt arises as to whether the great Conularia, Theca, etc., of the

Cambrian rocks are really correctly referred to the Pteropoda. Another interesting fossil that has been assigned to this order is *Tentaculites* from the Silurian, but this is unquestionably a worm.

Pterygogenea, the subdivision of Insects, including all those which have wings, or which, if wingless, such as the Fleas and Bird-lice, are descendants of winged forms. It thus includes all insects except the two members of the two small orders, the Collembola and Thysanura, which are grouped together as the Apterygogenea.

Ptilocerque (*Ptilocercus lowii*), an animal belonging to the family Tupaiidæ, or Bangsrings,



PTILOCRERQUE.
(*Ptilocercus lowii*).

of the order Insectivora. The specimen which Dr. J. E. Gray of the British Museum described in 1848 had been captured in Rajah Brooke's house in Borneo by Mr. Low and hence the creatures received the name of Low's Ptilocerque. Its specific name refers to what is its most distinctive feature, namely, its tail. The tail is long and slender, hairy towards the root; then comes an interval in which it is naked, but covered with rings of broad, square scales, among which a few hairs are scattered; finally, to the extent of one-third of its length, it is furnished with bushy hair so disposed as to produce the effect of a feather. From this characteristic the animals are sometimes called Pentails. They are extremely elegant little creatures, about six inches long, exclusive of the tail, which is at least as long again, or longer. Their general colour is blackish-brown and the tail is black with the long hairs at the tip white. The animal is found in Borneo and Sarawak.

Ptolemaic System, so called from the astronomer Ptolemy, was the theory of the universe which obtained until the 16th century, when that of Copernicus took its place. The main idea was that the earth was stationary and that all the heavenly bodies rotated round it in circles and at a uniform rate.

Ptolemy. After the conquest of Egypt by Alexander the Great, who founded Alexandria in 332 B.C., and was buried there, it passed under the rule of the Greeks. The Ptolemies governed it for 293 years, and the first four princes of that house made it a centre of commerce, learning and the arts. **PTOLEMY I.**, named **SOTER**, or the Preserver, son of Lagus and Arsinoë, concubine of Philip of Macedon, whose son he was supposed to be, was Alexander's favourite general. On the death of Alexander, in 323, he obtained Egypt, Libya and part of Arabia, and until the death of the boy-king Alexander IV., ruled as satrap under young Alexander's sovereignty. About 310-9 he was proclaimed King of Egypt, his royal dynasty began and an independent coinage of money was started. He made Alexandria his capital and erected the Pharos, or lighthouse, and an academy and founded the celebrated library which, at the time of the Roman conquest, contained 700,000 volumes. When the Romans attacked Alexandria the library was accidentally destroyed by fire and Egypt became a province of the Roman Empire. Ptolemy besieged Jerusalem, carrying off 100,000 captives, whom he dispersed throughout his own kingdom and seized Cyprus, which became a part of the monarchy as long as it continued. After ruling for thirty-eight years he abdicated in his younger son's favour. **PTOLEMY II.**, surnamed **PHILADELPHUS** in ridicule, because he put his elder brothers to death, constructed a great fleet and encouraged commerce. Under his patronage the Hebrew Scriptures were translated into Greek for the benefit of Jews living in Egypt, and this version is known as the Septuagint because it is believed to have been the work of seventy scholars. His wife Arsinoë was deposed through the intrigues of her stepmother, Ptolemy's sister, Arsinoë, whom he married. She bore him no children and had to adopt her rival's son. Incest was abhorrent to Greek sentiment, but recent research proves the marriage of a brother and sister in the royal family of Egypt was honoured as securing the blood-royal from the pollution of an inferior strain. When his wife died and during the last twenty-two years of his life Ptolemy continued to raise statues and other memorials in her honour and they were deified together. His son, **PTOLEMY III.**, made war against Syria, which he subdued, to avenge the death of Berenice his sister, and during his absence a revolt broke out at home. He hastened back bearing with him treasures and relics which had formerly been carried away from Egypt by the Persians. Overcoming the insurgents, by the wisdom of his rule he earned the name of **EUERGETES**, benefactor. After a reign of twenty-five years he is said to have been poisoned by his son **PTOLEMY IV.**, ironically called **PHILOPATER**, (father-loving). His cruel nature led him to put his mother, brother, uncle and sister, who was also his wife, to death. After a life of luxury he left Egypt, weak through bad administration, to a child whose mother was speedily murdered. Despoiled of her provinces the country was only saved by the aid of Rome, whose policy it suited to extend a protectorate over Egypt.

Ptolemy (**CLAUDIUS PTOLEMÆUS**), the astronomer and geographer, lived in Egypt in the 2nd century after Christ and is believed to have carried out his observations in or near Alexandria. His works were textbooks throughout the Middle Ages. His astronomical writings, from which was gathered the Ptolemaic System, consisted of the *Almagest* (*The Great Work*), or, according to its Greek title, *The Great System of Astronomy*; the work which contains the *Tetrabiblos Syntaxis* and the *Karpos* or *Book of a Hundred Aphorisms*; and a *Treatise on the Phenomena of Fixed Stars*. The *Geographia*, a work in eight books, illustrated by a map of the world and twenty-six other maps, was founded on the labours of a certain Marinus of Tyre. Ptolemy took Ferro in the Canaries as the westernmost part of the world from which to calculate his longitudes and placed it nearly 7° too far east. Latitudes were reckoned from Rhodes. His map of the British Isles contained two curious blunders. Ireland (Ivernia) was placed so far to the north that its southernmost part was placed on a latitude beyond that of North Wales, while Scotland was canted to such an extent that it was given a direction from west to east instead of from south to north, the northern limits of the island being represented on the same parallel as the Mull of Galloway. But crude as we are too apt to suppose Ptolemy's work, he was the first to attempt, and not without some measure of success, to reduce the study of geography to a scientific basis.

Ptoxis, drooping of the upper eyelid, usually due to paralysis of the third cranial nerve, which supplies the muscle whose function it is to raise the lid.

Ptyalin, a proteid substance existing in the saliva of the mouth. In its composition it closely resembles mucin. It is soluble in water and induces a fermentive change in starchy matters whereby they pass into soluble sugars. Hence it plays an important part in digestion in aiding the assimilation of the otherwise insoluble starch and allied compounds.

Puberty, the age at which the functions of the reproductive organs first become developed. It is marked in girls by the beginning of the menstrual flow; in boys by the breaking of the voice and the appearance of hair on the face. The phenomena of puberty are first manifested, as a rule, from the thirteenth to the seventeenth year, and sooner, ordinarily, in females than in males. In tropical countries the condition is generally reached at an earlier age than in temperate regions.

Publicani, in the days of the Roman Republic, were a class who farmed the public taxes, consisting chiefly of tolls, tithes, mining and salt duties, harbour duties and the rents of the public pastures. The office was put up to auction by the censors and was held for a period of five years. As the security required exceeded the wealth of any private citizen, companies (*societates*) were formed in which the speculators took shares. The *publicani*,

who generally belonged to the equestrian order, often amassed great wealth. Under the Empire they were to some extent superseded by state functionaries, but always retained the collection of the customs. The "publicans" of the New Testament were also farmers of the taxes, but in a much humbler way of business and, as Jews collecting tribute for the foreigner, were regarded by their fellow-countrymen as traitors and outcasts. The term "publican" as applied to the keeper of a tavern, inn, hotel and the like had no connection with the gathering of taxes, but probably gradually acquired its vogue from the place of his calling. This being a public-house, shortened familiarly into "public," the keeper of it naturally came to be styled a "publican."

Puccini, GIACOMO, composer, was born at Lucca in Italy in 1858 and studied at Milan under Amilcare Ponchielli. His chief works include *Manon Lescaut*, *La Bohème* and *Madama Butterfly*. Though to some extent influenced by the modern spirit, it is that rather of his own country and of France than of Germany; but the melody and brightness of his work have made it popular.

Puccinotti, FRANCESCO, physician and medical author, was born at Urbino, in Italy, in 1794 and studied at Pavia and Rome. After a brilliant career he became Professor of Pathology at Macerata University, but was deprived of the post in 1831 in consequence of his sympathy with the patriotic aspirations of the period. This intolerance did not affect his researches and his reputation was enhanced by treatises on forensic medicine and nervous maladies and his studies of cholera. In 1838 he was appointed to the chair of Medical Jurisprudence in the University of Pisa. He died at Florence on October 8th, 1872, and was buried in the church of Santa Croce. His greatest work was the *Storia Della Medicina*, but he was also author of valuable treatises on malarial fever, cholera, rice-disease and other subjects. He was also a distinguished classical scholar.

Puck occurs in *Piers Plowman*, a poem written by William Langland or Langley, in the latter part of the 14th century, as a name for the Devil. In Spenser (*Epithalamion*, 321) and in Burton (*Anatomy of Melancholy*, p. 126, ed. 1881) it is employed as a general term for an evil or mischievous sprite. It was also used to designate a brownie. The familiar notion of Puck is taken from the creation of Shakespeare in *A Midsummer Night's Dream*, where (act ii. scene i.), in the colloquy with the Fairy, Puck's nature and character are clearly shown. He was sometimes known as Robin Goodfellow and his pranks form the subject of a ballad attributed, on insufficient evidence, to Ben Jonson.

Puddingstone, or CONGLOMERATE, a consolidated shingle, consisting of rounded fragments or pebbles, generally silicious, cemented together by carbonate of lime, silica, iron oxide, or other material. The formation of such a bed may indicate a considerable lapse of time, since a rock

must be consolidated and exposed to denudation before pebbles can be formed from it and then the pebbles require to be cemented. The name puddingstone is specially applied to a conglomerate in the Woolwich Beds of Hertfordshire, consisting of black (raisin-like) flint pebbles in a brown ochreous (pudding-like) cement. The unequal hardness of the two materials caused this rock to be frequently used for handmills or querns.

Puddling, a process for the conversion of cast-iron into wrought-iron. The cast-iron is first purified by a process known as refining and is then heated strongly in a reverberatory furnace, the mass being thoroughly stirred or puddled until it reaches a semi-pasty condition. During the process some oxide is formed upon the surface, which, during the incorporation with the rest of the mass by stirring, oxidises some of the carbon of the cast-iron, producing oxides of carbon and purer iron.

Pudsey, a town of the West Riding, Yorkshire, England, 6 miles S.W. of Leeds, situated on high ground overlooking the valley of the Aire. The chief buildings are the church of St. Lawrence and the Mechanics' Institute, a fine Gothic structure with a tower. The manufactures are principally concerned with the cloth trade. Pop. (1901), 14,907.

Puebla, or LA PUEBLA DE LOS ANGELES, capital of the state of Puebla, Mexico, stands on a wide, fertile plateau, 7,200 feet above the sea, at a distance of 70 miles S.E. from Mexico. Founded in 1533, it stands third in rank among the cities of the republic and, owing to its position as a railway centre, is likely to maintain its importance. The cathedral dates from 1552, though not completed for a century. It was in connection with the erection of this church that the epithet "de los Angeles"—once always a constituent part of the city's title, but now practically dropped—arose. According to the local tradition, two angels added every night as much to the walls as the builders had raised during the day. Another less imaginative explanation is that the town was so named because of the beauty of its situation. The city is remarkable for the number of its churches, convents and monasteries. Other important buildings are the Palace of Justice, the State College and the School of Medicine with the Palafoxiana Library. The chief manufactures are cotton and woollen goods, leather, glass, straw-hats, paper, pottery and soap. In 1863 it was stormed by the French after two months' siege. Pop. (1900), 93,521. The STATE OF PUEBLA extends over some 12,000 square miles, being for the most part mountainous, but the plains bear rich crops of wheat, maize and fruit. It contains the celebrated volcanic peak of Popocatepetl. Pop. (1900), 1,021,133.

Pueblo, capital of Pueblo county, Colorado, United States, on the Arkansas, 45 miles S. of Colorado Springs. It has large iron and steel works, smelting furnaces, boiler works and stock yards, being the principal commercial and industrial centre in the south of the state. Among its

buildings is the State Mineral Palace. Pop. (1900), 28,157.

Pueblos (PUEBLO INDIANS), North American Indians of Arizona and New Mexico, so called because they occupy pueblos, or permanent agricultural settlements, where the whole community dwells in a single communal building, the so-called *casa grande* ("big house"), large enough to accommodate scores of families and constructed, like a fortress, with no outer doors and accessible only from the top of the enclosing walls, which are scaled by means of ladders. There are four distinct groups: (1) The Moqui or Tusayan, a branch of the Shoshonean (Snake) family, with seven pueblos, all east of the Colorado Chiquito, Arizona; numbering about 2,000. (2) The Keresan, speaking a stock language with settlements on the Upper Rio Grande and its affluents, New Mexico; numbering 3,500. (3) The Taínoan (stock language), with settlements on the Rio Grande between 33° and 36° N.; numbering over 3,000. (4) The Zuñian (stock language), New Mexico, 35° N., near the Arizona frontier; numbering about 1,700. The total Pueblo Indians may be estimated at between 10,000 and 11,000. The Pueblos have never been disturbed in the possession of their settlements and consequently represent the primitive sedentary peoples of this region, surrounded by nomad Apache and other wild tribes. Their culture is intermediate between that of the Mound-builders of the Mississippi basin and that of the Nahuas of the Mexican plateau. Some of the *casas grandes*, all of which are solid stone structures, resemble the wooden "long houses" of the Iroquois, while others seem to be a development of the habitations of the Cliff-dwellers in the cañons of the Colorado and other Western rivers.

Puerperal Fever, a febrile disease which sometimes occurs in women, manifesting itself between the third and the twelfth day after childbirth, and which is due to the entrance of poisonous or septic material into the blood. Before the recognition of the importance of antiseptic methods and scrupulous cleanliness in dealing with raw and wounded surfaces this disease wrought great havoc, particularly in lying-in hospitals. Another predisposing and common cause was the want of attention to the sanitary condition of houses, with the consequence that confinement in an unwholesome room—so often the lot of women of the poorest class—was as likely as not to occasion blood-poisoning to the unfortunate mother. The closer supervision now given to dwellings, water supply, adequate drainage, ventilation and kindred subjects by the Public Health authorities has reduced fever cases from this source almost to vanishing-point.

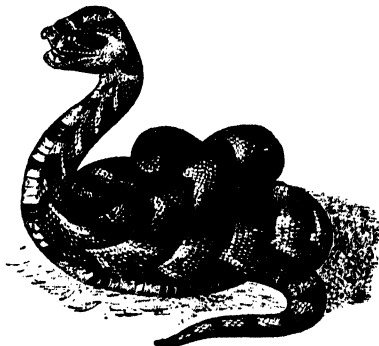
Puerperal Insanity. Three forms of insanity are met with in connection with child-bearing. If the mental disturbance occur during pregnancy, it will usually assume the form of melancholia. If it affect the patient shortly after child-birth, it will generally present itself in the form of what is

called puerperal mania; and lastly there is the insanity of lactation, which occurs occasionally in association with exhaustion arising from suckling. These forms of insanity are generally met with in subjects who have a hereditary tendency to mental disturbance and recovery is the rule; but there is a tendency to relapse in connection with subsequent labours.

Puerto Cabello, a fortified seaport of the state of Carabobo, Venezuela, South America, 20 miles N. of Valencia and occupying a headland (once a coral bank) in the Gulf of Triste. The harbour is safe and spacious. Coffee, cacao, hides, bark, indigo, woods, and cotton are exported, and the manufactures include leather, soap and candles, besides iron-founding and machine-shop products. The fortifications were bombarded and destroyed in 1902. Pop. estimated, 1,500.

Puerto de Santa Maria, or EL PUERTO, a seaport of the province of Cadiz, Spain, 7 miles N.E. of Cadiz, close to the mouth of the Guadalete. It is a well-built town with fine public promenades. As a place for the storing and exporting of Spanish wine it ranks next to Xeres, the stone bodegas or stores being a feature of the town. The manufactures include glass, leather, soap, starch and liqueurs and the fisheries are important. The bull-ring accommodates 12,000 spectators and the fights have acquired great notoriety, one being given in honour of the Duke of Wellington. Pop., 20,600.

Puff-Adder (*Clotho arietans*), a very venomous South African viper, which, when irritated, puffs out the anterior part of the body. It lies half-



PUFF-ADDER
(*Clotho arietans*).

buried in sand and is often trodden on, with terrible consequences, before it is noticed. The body is thick and the length from four to five feet. Of all the Cape snakes it is the deadliest and most to be feared. For, writes Mrs. Annie Martin, "being of the same colour as the ground, it is extremely difficult to see; it is lazy, too, and will not take the trouble to get out of your way as every other snake does; yet, when roused, it is very active and comes at you backwards, springing a long distance with

accurate aim. If you are in front of it you are safe, as it cannot strike forwards." She describes it as a repulsive creature, with "short, thick, swollen-looking body, toad-like head and utterly evil countenance."

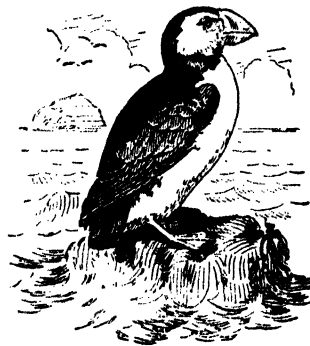
Puffball, a fungus belonging to several genera (and especially to the genus *Lycoperdon*) of the *Gasteromycetes*. It acquires its name from its habit of suddenly discharging or puffing clouds of spores in the form of fine dust. The Giant Puffball, the largest British species, sometimes attains a diameter of five feet. It is said to be edible when young, and when mature the dry spongy spores are occasionally used to staunch wounds and are also burned for the purpose of stupefying bees when it is necessary to remove the honey.

Puff-Birds (*Bucconidae*), a Neotropical family of small Picarian birds, with dense plumage of sober hue. In general form they are not unlike Kingfishers, some of which they resemble in habits, feeding chiefly on insects, which they catch in the air. They are found in South and Central America. Prince Maximilian of Neuwied says that the Long-winged Puff-Bird is a "stupid, still, melancholy bird, but likes to sit high and not low and near the ground, like other Puff-Birds. As in form and colour it rather resembles a swallow, the Brazilians call it Wood Swallow. The resemblance is greatest when the bird sits upon the ground, for its feet are little adapted for walking and it consequently shuffles along as a swallow does. Its flight is light and undulating. Sitting upon a high point, whence it can overlook the neighbourhood, it often emits a short call-note. It is anything but timid and very easy to shoot." Puff-Birds lay milk-white eggs in a poor nest consisting only of a few feathers, which is often constructed in the perpendicular sides of sand-banks in the rivers.

Puffendorf, or PUFENDORF, SAMUEL, BARON VON, jurist, was born at Chemnitz in Saxony on January 8th, 1632. He was educated at Leipzig for the Church, but abandoned theology for law, which he studied at Jena. His first work, *Elementa jurisprudentiæ naturalis*, was written while in prison at Copenhagen, where he was tutor to the sons of one of the Swedish envoys. He became professor successively at Heidelberg (1661) and Lund (1670) and was (1667) historiographer to the king of Sweden, who created him a baron in the year of his death, which took place on October 26th, 1694, while he was engaged upon the life of the Great Elector of Brandenburg. His reputation rests upon the *De Jure Nature et Gentium* (1672), but he also produced the elaborate *Commentariorum de rebus Sueciæ libri XXV*, which, like most of his historical works, shows him an adept in what Carlyle called the school of Dryasdust.

Puffin, a bird belonging to the genus *Fratercula* of the Auk family. The Common Puffin (*F. arctica*), familiarly styled "Tammy Norie," is common on both shores of the North Atlantic, visiting the northern shores of Great Britain in the spring and remaining to breed. The length is about a foot, the

upper surface is black and the under surface and a space round the eye are white. From their large, gaily-coloured bills, the sheath of which is shed at the end of the breeding season, these birds are called Sea-Parrots and Coulernebs. They swim and dive well and feed on fish and crustaceans. Their breeding-place is in a burrow, often stolen



PUFFIN
(*Fratercula arctica*).

from a rabbit, and they lay but a single egg. Richard Kearton says, in his well-known book, *With Nature and a Camera*, that he used to be somewhat sceptical about the stories of Puffins evicting rabbits from their burrows, but had his unbelief removed during his stay in St. Kilda, when he was bitten in the hand (to the drawing of blood) by a Puffin, while groping in a burrow for the eggs of a Forked-tailed Petrel. The St. Kildan fowler is so expert in snaring Puffins that he will take no fewer than six hundred in a day. So plentiful are the birds that it is estimated that nearly 90,000 are killed by the natives of St. Kilda in a year. They are plucked, split open like a kippered herring, hung up to dry on lines stretched across the cottage and grilled when wanted. Puffin Island, off the east coast of Anglesey, is a resort of sea fowl and especially of Puffins, which gather in such numbers as to have given the islet its name. The young birds, as well as the eggs, are used for food.

Pug, a name given to a breed of small smooth-haired dogs, said to have been introduced from Holland, though some writers also speak of a French breed. In shape, they resemble a miniature mastiff or bull-dog and are kept as pets or house-dogs. From being pampered and from their tendency to put on flesh, they are liable to many diseases which plain food and exercise would ward off. The Chinese Pugs are varieties of spaniels. One has long tawny hair, slender legs and a bushy tail curled over the back; the other is black and white, long-legged and prominent-eyed. Dr. Lockhart avers that the eyes are so prominent that he has known one snapped off by another dog in play. These dogs are reared on a vegetarian diet (mostly boiled rice) with a view to keeping down their growth. There seems to be no foundation for the statement that the pug nose is produced by force, suddenly or continuously applied, but when one remembers the feats which Japanese and Chinese have accomplished in the matter of training, the development of a dog's nose into something of a deformity would be a mere bagatelle.

Pugilism (Latin *pugil*, "boxer"), fighting with the fists, a form of sport which was a very popular pastime in England centuries before prize-fights grew the rage. The only kind of boxing that is still legal is that in which padded gloves are used. Up to the reign of George I. "the noble art of defence"—the word "self" does not seem to have been added till a later period—consisted in an exchange of "courtesies," more or less deadly, with the broadsword. Peppys describes in his *Diary* several bloody meetings of this kind which he had witnessed and as late as the time of Queen Anne of mortal memory cutting weapons were employed in public encounters. Fights appear to have taken place upon the stage sometimes, as the first championship event did in 1719, when Figg, at his own theatre in Oxford Road (London), defeated Ned Sutton, the Gravesend pipemaker. But the "father of British pugilism" was John Broughton (1705-89), who in 1742 opened a theatre for boxing in Hanway Street, London, leading from Oxford Street to Tottenham Court Road. He was the first to discard the backsword, quarterstaff and other weapons hitherto used in public fights. The rules drawn up by him remained in force till 1838. Of the pugilists who succeeded Broughton in the championship, those whose names are best known were John Jackson (1769-1846), the friend of Byron and Moore, whose polite manners earned for him the name of "Gentleman Jackson"; Tom Cribb (1781-1848), a man much esteemed for his straightforward and simple-minded character; and Tom Sayers (1826-65). A prize-fight was witnessed by the Allied sovereigns during their visit to England in 1814 and again by the Shah of Persia in 1873; but the increased vigilance of the police has now driven British pugilists to the Continent or the United States. When the ring became an established feature of English sport, women, dishonouring their sex, entered it as well as men. Their challenges were usually publicly announced and were couched in the braggart language so typical of these brutalising displays. They competed for stakes under what were styled the Old Rules, as distinguished from those of the P.R. introduced towards the close of George II.'s reign. One condition was known as the "one minute rule" from the fact that an interval of sixty seconds was allowed between each round. The earliest challenge from a boxing-woman emanated in 1722 from Elizabeth Wilkinson of Clerkenwell and she stipulated that both boxers were to hold half-a-crown in each hand, an ingenious device to prevent scratching. The rivals observed the recognised "shake-hands" before hostilities began. This always took place at the "scratch," the line in the middle of the ring which the combatants had to toe face to face before beginning their bout. Not only the principals but their seconds also engaged in this preliminary ceremony, all six crossing hands to do so with a view to preventing anything like a concerted rush by either side upon the unready foe. Each principal had two seconds. Clerkenwell enjoyed an unenviable reputation for demoralising exhibitions throughout the 18th century and even afterwards. In 1768 two women

fought for a new shift "in the Spaw Fields near Islington" and later in the same year and at the same place two women fought two tailors "for a guinea a head," victory declaring for "the ladies, who beat the taylors in a severe manner."

Pugin, AUGUSTUS WELBY NORTHMORE, architect, was born in London on March 1st, 1812, and educated at Christ's Hospital (the Bluecoat School). His father, AUGUSTUS CHARLES PUGIN (1762-1832), a Frenchman, was an architect of considerable ability and took his son into his own office, where he soon displayed exceptional capacity for drawing and sketching. At the age of 15 he was already designing furniture for Windsor Castle and, in 1831, he painted the scenery for the Drury Lane spectacle *Kenilworth*, and later rearranged the stage machinery of the theatre. About 1834 he joined the Roman Catholic Church, to which he was at first attracted by its sensuous ritual and his enthusiastic love of Gothic architecture. Meanwhile his practice grew apace, his connection chiefly lying amongst his co-religionists for whom he designed churches throughout England and to some extent in Ireland also. His designs seldom received justice, however, owing to the poverty of most of his patrons. He used to say that St. Augustine's Church in Ramsgate—where he latterly made his home and where he died on September 14th, 1852—was his best work because there he was his own paymaster. The Cathedral of Killarney perhaps suffered least of his other designs from motives of economy. He was unrivalled as a draughtsman and was employed by Sir Charles Barry in executing the detailed drawings for the Houses of Parliament at Westminster. He was an author of repute, his works comprising *Gothic Furniture in the Style of the Fifteenth Century* (1835), *Ancient Timber Houses* (1836), *Contrasts* (1836, a mordant comparison between modern and mediæval Gothic), *True Principles of Painted or Christian Architecture* (1841) and the *Glossary of Ecclesiastical Ornament and Costume*. His son EDWARD WELBY PUGIN (1834-75) stepped into his father's Roman Catholic practice and made it lucrative, though he lacked his father's genius. One of his works was the Granville Hotel at Ramsgate.

Pug-Mill, a machine for mixing and tempering clay. The usual form is a hollow iron cylinder, placed upright, with a revolving shaft in the direction of its length, bearing several knives disposed spirally around the shaft with their edges a little depressed. The clay, fed in at the top, is cut and kneaded by the knives as it descends and finally emerges through a hole in the bottom of the mill.

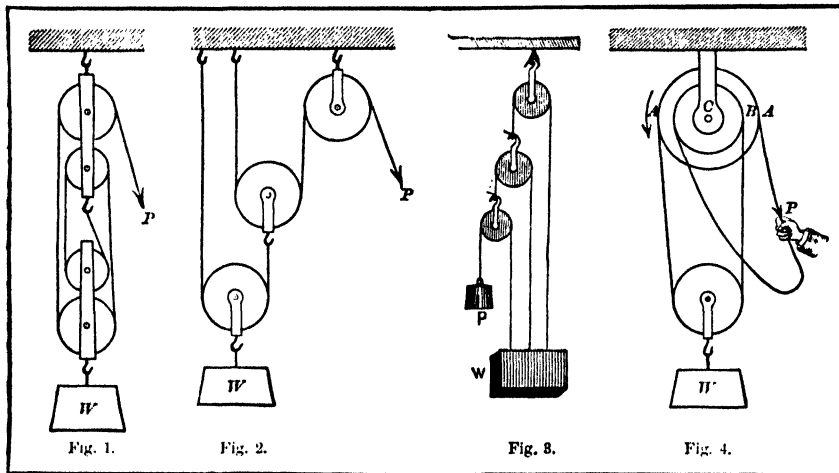
Pugs, a group of small moths belonging to the genus *Eupithecia* and including some forty English species. They seldom expand an inch across the wings, which are generally brown with darker transverse markings, though a few are varied with white or green. It is difficult to distinguish between them, as the ornamentation, etc., is all on the same pattern. The caterpillars are, however, often very different and thus breeding is usually necessary to secure accuracy of identification.

Pulci, LUIGI, poet, was born at Florence, Italy, on August 15th, 1432. He appears to have been employed in missions to different princes on behalf of Lorenzo de' Medici, whose friendship he enjoyed. His chief work, *Il Morgante Maggiore*, is a mock epic poem of chivalry dealing with the story of Roland and Ganelon, in which, however, the satire was probably unintentional, though the humour and comedy are his own. He also wrote *La Beca di Dicomano*, a pastoral poem, and other works, including a novel (in prose) and letters addressed to his patron. He died in 1484, probably at Padua. His elder brother, LUCA PULCI (1431-70), was also a poet and wrote *La Giostra*, an account of a tournament given by Lorenzo de' Medici, while his younger brother, BERNARDO PULCI (1438-88) translated Virgil's *Eclagues*, besides producing a mystery play on Balaam.

force P can sustain a weight equal to P multiplied by the number of cords going to or from the lower block. In the same way it can be shown that in the third system (Fig. 3) $w = P(2^n - 1)$ when n is the number of pulleys. In practice it is found that the loss due to friction is about 10 per cent. per pulley.

The Differential Pulley has one fixed wheel with two grooves and a movable wheel to which the weight is attached. A continuous chain passes round these as shown in the diagram (Fig. 4), slipping being prevented by recesses in the grooves, which fit the links of the chain. The moment of the forces due to the weight, acting in the direction

of the arrow, is $\frac{W}{2}(ac - bc)$, and if the weight be just sustained, the moment of P , which is $P(ac)$,



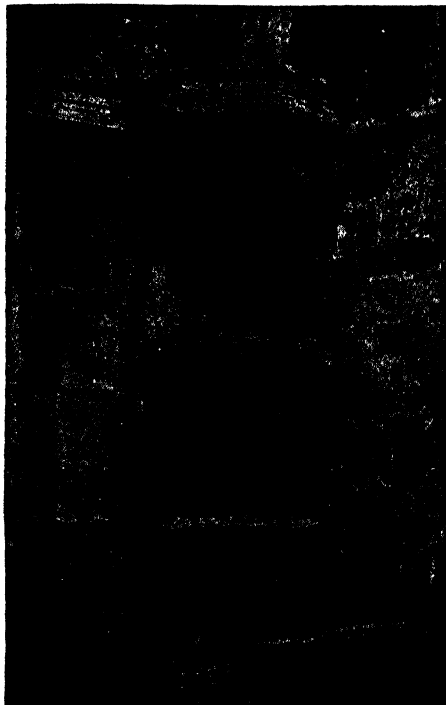
PULLEYS.

Pulley is a wheel whose edge is grooved for the reception of a rope or chain; one or more wheels or shears are usually fitted in a frame and called a block, the rope used with them being known as a fall. In using pulleys for ship's tackle or for lifting weights, it is necessary to determine the mechanical advantage of the arrangement and the systems of combining pulleys which are shown in Figs. 1, 2 and 3 are usually considered. The second of these is the only one of much practical importance. Looking (Fig. 1) at the upper pulley of system 1 and neglecting friction, it is evident that, as the tension in the cord due to the force P is the same in all parts of the string, there are two equal forces tending to lift the pulley, which is therefore raised with a force of $2P$. Repeating the process for the other pulleys, we obtain the result that the weight w which can be sustained by the force P is $P2^n$, when n is the number of pulleys. In the second system (Fig. 2) an equal upward tendency will be due to each string, so that in this case the

must be the same. It thus follows that $w = P \frac{2ac}{ac - bc}$, or the mechanical advantage equals the radius of the large groove divided by the difference between the radii of the two grooves; by making them nearly equal a very great weight may be lifted by a comparatively small force. The friction of the arrangement is, however, very considerable. Pulleys are also used in the transmission of power from one rotating shaft to another. They have smooth faces for belts or grooves for ropes. The larger the number of movable pulleys, the greater the mechanical advantage. [BELTING; ROPE-GEARING.]

Pullman, GEORGE MORTIMER, inventor of the railway car which bears his name, was born in Chataqua County, New York State, on March 3rd, 1831. He began life as a cabinet-maker, but was still a young man when he embarked upon the novel trade of moving buildings and warehouses

en bloc. Having long been familiar with the discomforts of night travelling by rail, he devised (1859-63) the sleeping car which at once found favour. He developed the principle into the drawing-room car and finally (1887), by the system of "vestibuling" the carriages, converted a whole train into a single car. In 1880 he founded the



OPEN-AIR PULPIT, ST. MAGDALEN'S, OXFORD.
(Photo: Cassell & Co.)

industrial town of Pullman, now absorbed by Chicago, for the accommodation of the factories of the Pullman Palace Car Company and the homes of the operatives. He died suddenly in Chicago on October 19th, 1897.

Pulmonata, the order of Mollusca the members of which have univalve shells, the nerve loop not twisted, and breathe by a pulmonary chamber or lung instead of gills. Owing to the simplicity of the arrangement of the nerves, they are included in the section Euthyneura of the unsymmetrical Gasteropoda. Another group of terrestrial air-breathing univalve Mollusca, including Cyclostoma, used to be included in the Pulmonata; but they are now excluded from it, as they belong to the Streptoneura. The Pulmonata are divided into two sub-orders: the Basommatophora, in which the eyes are at the base of the tentacles, as in the pond snails *Planorbis*, *Auricula*, etc., and *Styliom-*

matophora, in which the eyes are elevated on tentacles, as in the snails *Helix* and *Clausilia* and the slugs *Arion* and *Limax*. [**BASOMMATOPHORA**, **GASTEROPODA**, **STYLIOMMATOPHORA**.]

Pulpit, the elevated stage or desk in a church from which sermons are preached. They were formerly erected also in the refectories of monasteries, in cloisters and in public thoroughfares; there is one in the outer court of Magdalen College, Oxford. In former times the pulpits in churches were invariably placed in the nave, the officiating priests and other occupants of the choir removing thither during the delivery of the sermon. Many churches in England contain ancient pulpits, either of wood or stone, especially in Somersetshire and the neighbouring counties. Few of these are earlier than the Perpendicular period; but at Beaulieu, in Hampshire, there is a rich example of Early English or Early Decorated date. Stone pulpits were often constructed in the face of the wall and were approached by a hidden staircase. Pulpits of both kinds were usually polygonal and often much enriched, a common feature being the canopy or tester, of which there is a fine example at Castle Ashby, Northamptonshire.

Pulque, a fermented drink made in Mexico from the juice of the agave. When the plant is about to flower, the sap—which then abounds with sugar and gum—is led into a hollow formed by the removal of the bud and upper leaves. The juice is fermented in vessels made of raw hide. Pleasant to the taste at first and with a flavour like that of spruce beer, it ultimately acquires the putrid odour of the animal matter in the hides.

Pulse. Corresponding to each injection of blood into the arterial system, by the contraction of the left ventricle of the heart, there is a distension of the arterial tubes. This rhythmical distension can be seen in the temporal arteries of thin persons and can be readily felt in the radial artery, which is situated quite superficially at the wrist. If one end (the short arm) of a lever be applied to the radial artery, the end of the long arm gives in exaggerated form a record of the pulsation of the vessel and, if such movement be recorded on a travelling surface, what is called a sphygmographic tracing is obtained, the instrument used in making



SPHYMOGRAPHIC TRACING OF NORMAL PULSE-BEATS.
b, primary wave; d, diastolic wave; c and e, secondary waves.
such tracing being called a sphygmograph. On such a tracing the sudden rise and more gradual fall of the pulse-wave will be depicted and occa-

sionally the line of ascent or descent may be broken by a notch, a common appearance being such a break near the middle of the down curve (the dicrotic notch). The chief characters of the pulse as appreciated by the fingers are its frequency, its suddenness, the tension of the artery between the pulse-beats, the fulness or smallness of the pulse and the condition of the arterial coats. The normal pulse-rate in the adult is from 70 to 80 beats a minute. Immediately after birth the average number of pulses is from 130 to 140 a minute and in the third year the normal rate is still nearly a hundred. The frequency of the pulse diminishes until adult life is reached and it then undergoes still further, though more gradual, diminution with advancing years. Sometimes the characters of the pulse are almost sufficient in themselves to establish the diagnosis of certain forms of disease, as, for example, in the "water-hammer pulse" of aortic regurgitation. The study of the pulse is, moreover, a valuable guide to treatment, particularly in fevers.

Pulteney, WILLIAM, EARL OF BATH, the first leader of the Opposition in the House of Commons, was born in London on March 22nd, 1684, and educated at Westminster School and Christ Church, Oxford. He was distinguished by his classical attainments, which he fostered sedulously all his life. In 1705 he was elected M.P. for Hedon in Yorkshire, which he represented till 1734. On the accession of George I. he became a Secretary of State, but in 1717 went out of office with Sir Robert Walpole. When the latter became Premier, Pulteney was offered a peerage, but no office, and after a short time joined the Opposition against Walpole. He was sufficiently embittered to join Lord Bolingbroke in running a periodical entitled *The Craftsman*, founded for the purpose of hounding down Walpole, which lasted from 1726 to 1736. One of the episodes of this distracted period was a bloodless duel between Lord Hervey and Pulteney in what is now Green Park, Piccadilly, in 1731. In 1734 Pulteney was returned for Middlesex, for which he sat as long as he remained a commoner. To his eloquence and skill as a writer Walpole's fall (1742) was largely due; but Pulteney felt himself unable to take his rival's place and contented himself with the title of Earl of Bath. This step ruined his prestige at a blow; he was held up to obloquy as a sham patriot and he lost his popularity in the country. Sir Robert Walpole, now Lord Orford, took more characteristic and more generous revenge. When they met in the House of Lords he said, "Here we are, my lord, the two most insignificant fellows in England." In 1746 he (with Carteret) attempted, but failed, to form a ministry. He played no further part of consequence in public affairs and died on July 7th, 1764, and was buried in Westminster Abbey. He was one of the most brilliant orators the House of Commons has ever known, but as a man his besetting weakness was the love of money.

Pultowa, or POITAVA, a government of south-western Russia, in what is known as Little Russia, bounded on the N. by Tchernigoff, on the E. by

Kharkoff, on the S. by Ekaterinoslaff and Kherson and on the W. by Kieff. It has an area of 19,265 square miles, consists mostly of fertile land and is watered by the tributaries of the Dnieper. Agriculture is the chief pursuit, heavy crops being yielded of wheat, rye, oats, potatoes, melons and other vegetables, beets and tobacco, while cattle-breeding is of first-class importance and bee-keeping is also a feature of rural economy. The manufactures include alcohol, flour, tobacco, sugar and machinery. At Pultowa, the capital (63,060), Peter the Great defeated the Swedes under Charles XII. on June 27th, 1709. Pop. of province (1897), 2,791,504.

Puma (*Felis concolor*), or COUGAR, the "South American Lion," a large cat, ranging over South America and occurring in the Cordillera of Chile at a height of 10,000 feet. It is found occasionally in the unsettled parts of Central America and North America as far north as 60°. The miners know it as the "painter" (panther) and catamount. The thick close fur may vary from a yellowish- to a silvery-grey above and the under surface and the insides of the limbs are white. It is about the size of a leopard. It is a cowardly creature, but extremely active and very destructive to cattle and sheep, though it never attacks man, for whom it is said it has such a liking that it will scarcely defend itself if attacked by him. Although able to swim well when necessary, it avoids water as a rule. It is a good tree-climber and is thus a constant terror to the monkeys with which the equatorial forests abound. It is a remarkably silent animal, seldom uttering more than a hoarse grunt, though "spitting" and "swearing" when angry just like a domestic tom cat. The flesh is often eaten by the Indians of the Pampas, and Charles Darwin thought it tasted like veal—a curious point, since the flesh of most of the Carnivores is the reverse of palatable. It always squats to feed and seldom, if ever, uses its paws to steady its food. In confinement the puma readily becomes tame and gentle and it has been kept as a pet. The cubs resemble those of the lion in that they show signs of darker markings on the ground colour.

Pumice, lava from which gas or vapour has profusely escaped whilst in process of cooling and consolidating, being thus, so to say, a lava froth of loose, spongy, or cellular texture. Usually it is a variety of obsidian, containing about 70 per cent., sometimes a little more, sometimes a little less, of silica. It is so porous that it floats for a considerable time on water after being ejected from a volcano, but when it has become thoroughly saturated and water-logged, it then sinks to the bottom. Being extremely hard, though brittle, it is used in households for cleaning wood, metal, glass, marble and other articles and even for scrubbing the hands.

Pumpnickel, a coarse bread made of unbolted rye, particularly used in Westphalia. It has a little acidity but, though not very nourishing, is not unpleasant to the palate. The word is said to have been originally applied to a heavy, blooish country lout.

Pumpkin (*Cucurbita Pepo*), an annual plant, belonging to the order Cucurbitaceæ, of uncertain nativity. It is supposed to be of Asiatic origin, but has been cultivated in England since 1570. It was probably known to the American aborigines and planted by them among their maize. It has large, rough, five-lobed leaves, unbranched tendrils and an oblong fruit varying in size and shape, but often very large. Mixed with sliced apples, sugar and spice and baked, it is eaten as pumpkin pie, a dish now more familiar in the United States than in England, where this vegetable has been largely superseded by its variety, the Vegetable Marrow.

Pumps, machines for raising or moving water and other fluids. The commonest form, or suction pump, consists of a cylinder or "barrel," to the bottom of which is joined a pipe which dips below the surface of the liquid to be raised. A valve opening upwards is fitted at the junction of barrel and pipe and a piston can be moved up and down in the barrel by means of a lever and handle. The piston is also provided with a valve capable of moving upwards and the outlet for the liquid is near the top of the barrel. Imagine the piston to be moving upwards from its lowest position; atmospheric pressure keeps the piston valve closed and a partial vacuum is obtained beneath it—hence the liquid rises in the pipe, opens the junction valve and follows the piston upwards. After a while the piston is caused to descend; the liquid beneath it pushes its way through the piston valve, for its pressure causes the lower valve to shut, and so its retreat is cut off. The next time the piston rises, the liquid above it is carried to the outlet, where an intermittent stream is therefore obtained. If a long pipe be connected to the outlet and the top of the barrel be provided with a stuffing-box fitting the piston-rod, the water can be lifted to any height in the pipe. This form of pump is known as the lifting pump. If, again, there be no valve in the piston, but a second pipe leading from the bottom of the barrel be provided with a valve opening into it, liquid will be forced into this pipe as the piston descends. This is known as the force pump. An air chamber is often attached to the outlet pipe to equalise the flow of liquid. The fire-engine and the steam-engine feed-pumps are always of this type. Specially modified forms of pumps are used for acids, soap, sludge and other kinds of liquid.

Punch, the name of the hero in the puppet show, is an abbreviation of Punchinello, the original form of which is said to have been Pulcinello (Italian, "little chicken"); but on this theory the name implies something small, whereas the character of Punchinello is said to have been derived from the ordinary Neapolitan stage-comedy. Whatever truth there may be in the view which regards Punch as the descendant of the Maccus of the Atellanæ, there can be no doubt that in his present character, at any rate, he is a creation of modern times. His invention is ascribed to Silvio Fiorillo, a comedian who lived at the beginning of the 17th century. Punch soon became popular

in France and seems to have been introduced into England soon after the Restoration.

Punch, a drink derived from India, the designation of which is due to the fact that it is properly composed of five (Hindu, *panch*) ingredients—arrack, tea, sugar, water and lemon juice. The last three of these are mixed with alcohol, rum for choice, to form the punch now drunk in England, the name (rum-punch, milk-punch, etc.) differing according to the liquor employed. Wine, tea and other ingredients are sometimes added.

"Punch; or, The London Charivari," the leading English humorous journal, was started in 1841 under the editorship of Henry Mayhew and Mark Lemon. Many well-known writers have contributed to its pages, including W. M. Thackeray, Tom Hood, Douglas Jerrold and Albert Smith. Among its editors have been Mark Lemon, Shirley Brooks, Tom Taylor and Sir Francis Burnand. *Punch* has always been conspicuous for the excellence of its illustrations and the reputation established by H. K. Browne, Richard Doyle (who designed the famous frontispiece of the wrapper), and John Leech has been worthily maintained by Sir John Tenniel (whose cartoons sometimes attracted universal attention), George Du Maurier, Charles Keene, Linley Sambourne, Bernard Partridge, E. T. Reed, H. M. Brock, A. Rackham, F. H. Townsend, Harry Rountree and L. Raven Hill. In 1906 Owen Seaman was installed as editor in succession to Sir F. Burnand.

Punctuation, the use of certain marks or signs which are supposed to indicate the divisions into which a sentence naturally falls and particularly to assist in making clear the writer's meaning. The latter consideration, indeed, is the be-all and end-all of punctuation, without which it were better to follow the example of the lawyers and dispense with punctuation altogether. The marks most commonly employed are the full stop or period (.), colon (:), semi-colon (;), comma (,), mark of exclamation (!), mark of interrogation (?), inverted commas (" "), dash (—) and brackets () or [].

Punjab ("five rivers," namely, the Sutlej, Beas, Chenab, Jhelum and Ravi, by which it is watered), a large province in the north-west of British India, bounded on the N. by the North-west Frontier Province and Cashmere, on the E. by Tibet and the United Provinces of Agra and Oudh, on the S. by Rajputana, on the S.W. by Sind and on the W. by Baluchistan and the North-west Frontier Province. Including the feudatory native states (Patiala, Bhawalpur, Jind, Nabha, Kapurthala, Mandi, Sirmur and Chamba, which have a combined area of 36,226 square miles) the Punjab has an area of 133,435 square miles. The tracts between the chief rivers are known as doabs ("two rivers") and that which separates the Indus from the Jhelum is traversed by the Salt Range, containing vast supplies of rock-salt. Coal and petroleum are found in this neighbourhood. Though much of the surface is arid, by the use of irrigation canals the fertility of the soil is greatly increased in

districts beyond the influence of the rivers. The Punjab is thus the wheat granary of India. Large crops are also raised of rice, pulse, oil-seeds, sugar cane and cotton, while tobacco, indigo and tea are also cultivated. Cattle, buffaloes, sheep and goats are also reared in great numbers. There are no leading industries, but the manufactures include cotton, woollens, sugar and flour, besides brewing and the mining of coal and salt. The native industries comprise, among other things, carpet-weaving, silk-embroidery, shawl-making and various kinds of ornamental art. The climate, though exceedingly hot in summer and cold even to frost in winter, cannot be regarded as unhealthy. Lahore (202,964) is the capital and other important cities are Multan (87,394), Amritsar (162,429), Ambala (78,638), Rawalpindi (87,688) and Sialkot (57,956). About half the population consists of Mohammedans, Hindus and Sikhs making up nine-tenths of the other half. In November, 1901, the area of the Punjab was reduced by the creation of the North-west Frontier Province with Peshawar as its capital. The Punjab is administered by a lieutenant-governor and a legislative council of nine nominated members. Pop. (1901), 24,754,737.

Punjabi, a neo-Sanskritic language current throughout the province of Punjab, North-west India, where it is spoken chiefly by Sikhs. There are two main branches of it—Dogri, of the lower hills between the Upper Chenab and Jhelum rivers, south of Cashmere, and Multani, with Sindhi affinities, about the lower course of the Indus. Punjabi is closely allied to Hindi, but is largely charged with Persian and Arabic elements and written with the Gurumukhi alphabet, a modernised form of Devanagari, with 35 letters.

Punkah, a cloth stretched on a frame which is hung from the ceiling of rooms of houses in India and kept in motion by a servant, called a punkah-wallah, the object being to cool the air of the apartment. In some establishments the punkah is driven by machinery.

Pupa, the stage in the development of an insect which intervenes between the caterpillar and the perfect insect. It may be quiescent, as in the larvae of butterflies, which are known as chrysalids; or may be active, as in all insects having an "incomplete" metamorphosis. The pupa usually is of a brown colour, though in the butterfly it may be green, yellow, or metallic. The parts of the mature insect (head, thorax, and abdomen) may be made out in an imperfectly developed state through the horny covering which envelops the whole and prevents nearly all movement. The duration of the pupa state varies, though in the majority of instances it lasts for several months, since in these cases the insects pass the winter in this condition. The name of pupa was applied in allusion to the swathed appearance presented by the butterflies and moths during this period of their existence, *pupa* being the Latin word for an infant in swaddling clothes.

Pupil. [EYE.]

Puranas (Sanskrit, "old"), a body of religious compositions on which the popular faith of the Brahminical Hindus is mainly based. They are written in epic couplets and consist to a large extent of epic myths and legends, much space being also devoted to the character of the gods and the origin of the universe. They are ascribed to Vyasa, but, in their present form at any rate, they are probably not later than the 9th or 10th century of the Christian era.

Purbeck Beds, the highest series of the Jurassic rocks in England, typically developed in the Isle of Purbeck, in Dorsetshire, but occurring also in the Isle of Portland; at Swindon; near Aylesbury and near Battle, in Sussex. The series passes, with but little break, downwards into the marine Portlandian and upwards into the freshwater Wealden series; but itself combines marine and freshwater rocks. It is divided into three parts, the lowest, mainly freshwater limestones or Purbeck marble, made up of shells of mussels (*Unio*) and of snails (*Viriparus*), with shales and "dirt-beds" or ancient soils; the middle, mainly marine; and the uppermost, again freshwater. A bed of oyster-shells (*Ostrea distorta*), 12 feet thick, is one indication of marine life and considerable beds of gypsum point to the evaporation of inland waters. Many insect remains occur at some horizons and chelonian and crocodilian remains (*Goniopholis*) are frequent. Near the base of the Middle Purbeck, at Swanage, the lower jaws of various rat-kangaroos have been discovered, as if dropped by carcasses floating in an estuary. The Purbeck marble of Dorsetshire was much used in the mediæval architecture of southern England and the gypsum discovered in the Sub-Wealden boring near Battle is now worked. The Isle of Purbeck is a peninsula bounded on the N. by the river Frome and the harbour of Poole, on the E. and S. by the English Channel and on the W. by a tributary of the Frome. It contains the pretty and bracing little watering-place of Swanage and the splendid ruins of Corfe Castle and it is about 12 miles long by 7 miles in breadth.

Purcell, HENRY, composer, was born in Westminster in 1658 and became a chorister in the Chapel Royal at the age of six. He is said to have composed an "Address of the Children of the Chapel Royal to the King" when he was 12 and the music for *Macbeth*, commonly ascribed to Matthew Locke, has also been claimed as by Purcell when he was 14. In 1676 and following years he began to provide music and songs for various plays, besides anthems. His first great work was his opera of *Dido and Æneas*, which belongs to 1680, the year in which he succeeded John Blow as organist to Westminster Abbey. Two years later he was appointed also organist of the Chapel Royal. In 1683 he published sonatas for two violins and a bass. Henceforward to the end of his short life (which terminated at Westminster on November 21st, 1695) his industry was amazing and the quality of his work almost always of the highest. His compositions for the theatres included the music to Dryden's *Tyrannic Love*, to Betterton's adaptation

of Beaumont and Fletcher's *Dioclesian*, to Dryden's adaptation of *The Tempest*, the opera of *King Arthur*, the *Indian Queen* and the *Fairy Queen* (an adaptation of *A Midsummer Night's Dream*). He wrote what is now known as "The Yorkshire Feast Song" for the accession of William and Mary, and a burial service for Mary's funeral. He produced a series of odes for St. Cecilia's Day, several songs for D'Urfey's *Don Quixote* and many anthems, chants and glees of exquisite beauty. His technical equipment was complete. He was a master of expressive and emotional writing, anticipated the broad choral effects of, Handel, to whom he was not inferior in melody, and, for his directness of utterance as much as for his learning (undoubtedly though it was) combined with his other qualities, he ranks as the greatest English composer.

Purchas, SAMUEL, recorder of travels, was born about 1575 at Thaxted in Essex and was educated at St. John's College, Cambridge. Taking holy orders, he became in 1614 chaplain to George Abbot, Archbishop of Canterbury, and from this year till his death in 1626 was also rector of St. Martin's, Ludgate Hill, London. He was the author of *Purchas his Pilgrimage; or, Relations of the World and the Religions Observed in all Ages and Places from the Creation unto this Present* (1613), and *Purchas his Pilgrim. Microcosmus, or the History of Man. Relating the Wonders of his Generation, Vanities in his Degeneration, Necessity of his Regeneration*. . . . (1619). But in the work to which the parson owes his fame he played the part rather of editor than of author. This was *Hakluytus Posthumus; or, Purchas his Pilgrimes, containing a History of the World in Sea Voyages and Land Travels by Englishmen and Others* (1625). The narratives of early voyagers would probably have been lost to us had they not been entrusted to Purchas for the purposes of his collection.

Purgatives are drugs employed with a view to producing increased intestinal action, whether it be by promoting excretion of the intestinal glands by the administration of salines or of cathartics, or by increasing peristalsis by stimulating the nervo-muscular structures of the alimentary canal.

Purgatory, a place in which, according to the doctrine of the Roman Catholic Church, expiation is made for sins which remained unpunished during the sufferer's lifetime. The belief in such a place rests on the view that, although the penalty of eternal torment has been remitted through the death of Christ, Divine justice requires that every sinful act should be followed by punishment, either in this world or in the next. Gregory the Great was the first who distinctly formulated the doctrine afterwards accepted by the Councils of Florence (1439) and Trent (1545-63). The canons of these Councils not only assert the existence of a Purgatory, but declare that the sacrifice of the Mass and the prayers and alms of believers are efficacious in relieving the sufferings of those who are there detained. They make no statement, however, as to

the locality of Purgatory or the character and duration of the punishment.

Purim, a Jewish feast which commemorates the deliverance of the nation from the machinations of Haman related in the book of Esther. It takes place on the 14th and 15th of Adar (about the 1st of March) and is always celebrated with much merry-making, but is preceded by the Fast of Esther on the 13th of Adar. Both the feast and its name have been traced to the Persian *Purdiyān* (*Pōrdiyān*).

Puritans, a name given to those who refused to assent to Elizabeth's Act of Uniformity on the ground that it was too favourable to Roman Catholic doctrine and ritual. According to Strype, it was first applied in 1569, but Fuller mentions its use as early as 1564. The earlier Puritans for the most part advocated a Presbyterian form of government; Richard Hooker's *Ecclesiastical Polity* (1594) marks the final position of the Church of England against them. During the reigns of James I. and Charles I. the main body of the Puritans continued to hold Presbyterian and Calvinistic views; but the Independents were now gaining strength and, before the establishment of the Commonwealth, the term Puritan had become identified with them rather than the Presbyterians. The change in the use of the term was justified by the character of those to whom it was applied, for the Independents were even more remarkable for their austere lives than the Presbyterians. After the Restoration the term "Puritan" fell into disuse, "Nonconformist" and "Dissenter" taking its place.

Purley, a village of Surrey, England, 3 miles S. of Croydon, of which it has become virtually a pleasant residential suburb. It formerly belonged to a family to whom it gave their name. William de Pirelea had a grant from John, Abbot of Hyde, of the moiety of a wood called Nithea, in the manor of Sanderstead, and in 1332 Reginald de Pirelea obtained a licence to celebrate Divine service in his oratory at Sanderstead. Purley was formed into an ecclesiastical parish in 1881, the church, Christ Church, being built three years earlier, the register dating from 1878. Reedham Orphanage and the Warehousemen and Drapers' Schools, an imposing building on Russell Hill, are prominent buildings. The neighbouring chalk downs rise to 500 feet, affording many attractive walks and extensive views over the surrounding country. Purley Beeches, almost the only survivors of a forest primeval, a beautiful bit of woodland, where "lords and ladies," wood mercury, rooks and song-birds abound, have been preserved unspoiled from the builder. At Purley House, once the home of the regicide Bradshaw, lived wealthy William Tooke. John Horne, a clergyman who abandoned his orders in 1773 for politics and the law, assisted Tooke to resist an Enclosure Bill which would have lessened the value of his property. This gained him Tooke's favour and £8,000, and, being made his heir, he assumed his name. In this pleasant old house he wrote *The Diversions of Purley*, a medley of many things, published in 1786. Characterised by

Sir James Mackintosh as a "wonderful work of original thought," *Blackwood* labelled it a "consummate compound of ignorance." It was never completed. Building a vault in the garden, he had his tombstone engraved "John Horne Tooke, late Proprietor, and now Occupier of this spot," but, dying at Wimbledon, where he spent the last twenty years of his life, he was buried at Ealing in 1812, and left his money to his natural children. Pop. (1901), 1,660.

Purple Emperor (*Apatura iris*), one of the most beautiful of British butterflies. It measures from two to more than three inches in expanse and is of a dark brown above, spotted and barred with white, and there is a red ring near the apical angle of the hind wings. The male is shot with rich purple, and is remarkable for his lofty flight, usually perching on the tops of the tallest trees. Although difficult to capture, it sometimes descends to drink from a puddle or to feed on carrion. The caterpillar, which feeds on willow, is green, and has two horns on the head.

Purpura, a genus of marine carnivorous Gasteropoda, in which the shell is striated or tuberculated, with a short spire and a large aperture, slightly notched in front, the inner lip being flattened. *Purpura lapillus*, the only British species, has, behind its head, a receptacle containing a white fluid which, on exposure to air and light, reaches a brilliant tint through gradations of yellow, green and blue. The dye thus obtained can be made permanent easily and was once employed in Irish manufactures, though it has ceased to be used, partly, no doubt, in consequence of the difficulties of adequate supply. The creature discharges its dye when the operculum is pressed. *Purpura* crawls about on the shore between the limits of high and low water. It is very destructive to mussels, winkles, limpets and other mollusca. It is a ferocious and vindictive tyrant. Bringing its aperture opposite to that of its victim, it then introduces its trunk, and is only satisfied when it has absorbed all the succulent parts of its prey. If it cannot attack by way of the aperture, it bores through the shell with appalling patience until it has made an opening large enough to extract the quivering substance.

Purpura, the term applied to the condition in which extravasations of blood occur beneath the surface of the skin. It is often, though erroneously, classed as a skin disease, but is in reality a disorder of the blood. These extravasations form discoloured blotches, at first red but subsequently changing colour after the manner of a bruise. They do not disappear on pressure and gradually fade away, sometimes to be succeeded by further crops. Purpuric spots are met with in certain fevers and in conditions of anæmia and malnutrition, sometimes in association with rheumatism and with scurvy. The indicated treatment is to correct the state of the blood, which is best carried out under medical advice. Varied nutritious diet, tonics, abundance of rest in bed, the avoidance of stimulants are all helpful, though the use of iron should be eschewed.

If there be bleeding from accessible parts the application of ice or powerful astringents may be called for.

Purpurin, a dye-stuff which occurs, together with alizarin, in the madder root. It may be prepared from alizarin, to which it is very closely allied chemically, by heating it with an oxidising agent. Its composition is represented by $C_{14}H_8O_6$ and it forms orange-coloured crystals which are soluble in hot water. It may be mordanted on to cloth and, along with many of its derivatives, is used as a dye. Its chemical reactions show it to be a derivative of the compound known as anthraquinone.

Pursuivant, literally a follower or messenger, especially one who attended the king in his campaigns. The term is now only found (apart from literary usage) in heraldry. The pursuivant is one of the third or lowest degree of heraldic officers. The English College of Arms has four, named Rouge Croix (Red Cross), Blue Mantle, Rouge Dragon (Red Dragon), and Portcullis. In the Scottish Court of the Lyon King of Arms there are three—Unicorn, Carrick (an ancient division of Ayrshire: the Prince of Wales is Earl of Carrick) and Bute. The Court of the Ulster King of Arms in Ireland possesses four—Athlone and St. Patrick 1, 2 and 3.

Pus, or **MATTER**, is the thick, creamy, yellow faint-smelling fluid which is sometimes formed as the result of inflammatory processes. It consists of pus cells, which resemble broken-down leucocytes, and of granules, fatty matter and fluid material. Pus may be either healthy (or, as it is sometimes quaintly termed, laudable or praiseworthy) or unhealthy (in which case it is watery and thin, irritating, mixed with blood, or offensive-smelling).

Pusey, EDWARD BOUVERIE, divine, was born at Pusey, in Berkshire, on August 22nd, 1800. He was a grandson of the first Viscount Folkestone, the additional name of Pusey having been assumed by his father on succession to the Berkshire estates. Educated at Eton and Christ Church, Oxford, he became fellow of Oriel in 1823. After about two years spent in Germany he returned to Oxford and from 1828 till his death held the Regius Professorship of Hebrew, attached to which was a canonry of Christ Church which necessitated Pusey's ordination to the priesthood. He was one of the chief leaders in the Tractarian controversy and wrote the tracts on *Baptism* (1835) and *The Eucharist* (1836). To the *Library of the Fathers*, edited by himself, he contributed translations of St. Augustine's *Confessions* (1838) and some works of Tertullian. In 1843 Pusey's views were condemned by the theologians of the university and he was suspended from preaching for two years. After the secession of Newman he became the leader of the High Church party in the English Church and the older school of Ritualists were called Puseyites. His chief works at this period were those on *The Royal Supremacy* (1850) and *The Doctrine of the Real Presence* (1856). Later came the *Eirenicon* (1865-70), a statement of the grounds he thought proper for reconciliation with Rome. In later years he

also wrote against the Rationalists, defending the received date of the book of Daniel and the dogma of Eternal Punishment in answer to Archdeacon Farrar's sermons on *Eternal Hope* preached in Westminster Abbey in 1877. He died at Ascot Priory, in Berkshire, on September 14th, 1882.

Pushkin, or Poushkin, ALEXANDER SERGEIEVICH, poet, was born at Moscow, Russia, on June 7th, 1799. In early life he was sent to Bessarabia on account of his revolutionary views, but his ability and popularity afterwards procured him the post of historiographer. His fame as a poet was gained by the tragedy *Boris Godunov* (1825) and some excellent lyrics; but he was almost equally distinguished as the writer of *Eugene Onegin*, the *History of the Revolt of Pugachev*, and some stories partly in the manner of Edgar Allan Poe, such as *The Undertaker*, *The Pistol Shot*, and *The Captain's Daughter*. Pushkin was mortally wounded in a duel with his brother-in-law, whose attentions to his wife had aroused his jealousy, and he died in St. Petersburg on February 10th, 1837. He is the greatest poet Russia has produced.

Pustule, a small accumulation of pus occurring below the surface of the skin. Pustules usually begin as vesicles, the clear fluid of which takes on a purulent character. Malignant pustule is the term applied to the local lesion of anthrax.

Putnam, ISRAEL, general, was born at Salem, Massachusetts, on January 7th, 1718. He became a farmer on a large scale, and was especially successful in raising sheep and winter apples and other fruit. He was absolutely fearless and, being gifted with a turn for strategy, saw much service against the French. In 1758 he was captured and tortured by the Indians and was barely rescued from death. In 1762 he went on the Havana expedition and two years later to the relief of Detroit. In 1775 he commanded the forces of Connecticut against the British and, having been made a major-general by Congress, soon afterwards headed the American forces at Brooklyn. He subsequently commanded on the Hudson and elsewhere. He died at Brooklyn, Connecticut, on May 19th, 1790. His cousin, RUFUS PUTNAM (born at Sutton, Massachusetts, on April 9th, 1738; died at Marietta, Ohio, which he had founded, on May Day, 1824), was a general of ability who served against the French, the British and the Indians, and was from 1793 to 1803 Surveyor-General of the United States. Israel's grand-nephew, GEORGE PALMER PUTNAM, was born in Brunswick, Maine, on February 7th, 1814, and was trained as a publisher. In 1848 he started business in New York on his own account and established *Putnam's Magazine* four years later. In 1863 he became United States collector of internal revenue, and in 1866 founded the house now known as G. P. Putnam's Sons. As early as 1837 he published *A Plea for International Copyright*, which was the earliest advocacy of the reform in the United States. He died in New York on December 20th, 1872.

Putney ("Putenhie," or isle of Puten, of Domesday Book), a parish and district on the

south bank of the Thames, Surrey, England, 6½ miles S.W. of St. Paul's, forming a residential suburb of London. A ferry to Fulham, on the Middlesex shore, existed here from the 10th century, and was replaced in 1729 by the picturesque wooden bridge which J. M. Whistler delighted to etch and draw, and which in turn gave way to a stone bridge erected in 1884-6. The Church of St. Mary adjoining the bridge, though dating from the beginning of the 14th century, was mostly rebuilt in 1836. It contains (removed from the south to the north side of the chancel) the chantry erected by Nicholas West, Bishop of Ely, a native of Putney, in the reign of Henry VIII. Other eminent natives were Thomas Cromwell, Earl of Essex, and Edward Gibbon the historian, while William Pitt died (1806) at Bowling Green House. Owing to its proximity to London many great men have resided here for longer or shorter periods, among them Bishop Bonner; Robert Devereux, Earl of Essex; David Mallet, the poet; John Toland, the deistical writer, who was buried in St. Mary's churchyard (1722); James Macpherson, the translator of *Ossian*; Theodore Hook; Mary Wollstonecraft, Shelley's widow; General Fairfax; Douglas Jerrold; Mrs. Siddons; David Hartley, the inventor of fire-proof houses, commemorated by an obelisk on Putney Heath; Dr. John Rae, the economist; Mackenzie Bell, the poet; T. Watts-Dunton, and Algernon



PUTNEY BRIDGE

Charles Swinburne. The Heath, once infested with highwaymen, was also resorted to for the purpose of duels, and here took place the encounters between Pitt and George Tierney (1798) and between George Canning and Lord Castlereagh (1809). Oliver Cromwell was also an occasional visitor along with General Ireton. Owing to its salubrity the district has been chosen for many charitable institutions, such as the almshouses for women founded by Sir Abraham Dawes, a resident, in 1639; the Watermen's School, a thankoffering of Thomas Martyn to a Putney waterman for saving his life in 1684, and the Royal Hospital for Incurables. Putney (with very few exceptions) has been and is the starting-point for the boat-race between Oxford and Cambridge Universities and for numerous other important contests. Pop. (1901), 24,139.

Putting, in golf, the act of playing the ball when it is within a very short distance from the hole. Each hole is surrounded by a smooth-kept piece of turf, known as the putting-green. The club used at this stage is comparatively short and has a very stiff shank and is called the putter.

Putting the Stone, or **WEIGHT**, an athletic sport, common in Scotland and also found in Canada, the British colonies and the United States. With the stone or weight (16lb.) resting in his right hand, which is supported on his shoulder, the athlete takes a few energetic hops or strides (to give himself impetus) as far as the take-off line, where he hurls the stone forward with all his might as far as he can, the farthest throw gaining the prize.

Puis de Chavannes, **PIERRE**, the great decorative painter, was born at Lyons, France, on December 14th, 1824. His father, a mining en-

wards in Couture's studio. Although he never mastered drawing in the academic sense, he drew with a feeling and expression denied to most academic masters. From the very outset his work was essentially decorative. His aim was to decorate the walls of monuments so that the decoration should harmonise with and actually become a part of the building. This is, essentially, Decoration's only true and proper end. The greyness of his colour tones, which are extraordinarily refined and delicate, enabled him to attain this object. His work is remarkable for the perfection and simplicity of its composition, especially noticeable in the grouping of figures, for its charm and refinement of colour and for its deep feeling. In the Salon of 1861 he exhibited two large panels entitled "Concordia" and "Bellum." These, together with "Travail" and "Répos," exhibited in 1863, and "Ave, Picardia Victrix," 1865, were used to decorate the museum at Amiens. To these were added "Ludus pro patria" in 1880 and "Le jeune Picard s'exerçant à la lance" in 1882. "Autumn" was exhibited in 1864. The year 1868 saw the painting of "Le Jeu" for the "Cercle de l'Union Artistique." In 1869, for the decoration of the Palais de Longchamp at Marseilles, he painted "Marseille, colonie grecque" and "Marseille, porto de l'Orient." In 1870 he exhibited two easel-pictures—an unusual departure—entitled "Madeleine au désert" and the famous "Décollation de Saint Jean Baptiste" at the Durand-Ruel Galleries. In 1872 he showed "l'Espérance" and in the following year "l'Été." In 1875 he completed two paintings for the decoration of the Town Hall of Poitiers, namely, "Charles Martel, vainqueur des Sarrasins" and "Ste. Radégonde au Convent de Ste.-Croix"; and in the following year he exhibited the cartoons of those marvellous paintings dealing with the life of Ste. Geneviève—the patron-saint of Paris—which, originally intended for the church of that saint, are now to be seen in the Panthéon. This wonderful work, which marks an epoch in the history of the Art of Decoration, won for him the tardy admiration of the critics and general public. In 1879 he painted "l'Enfant prodigue" and "Jeunes Filles au bord de la Mer." "Le pauvre Pêcheur," which was on exhibition in the Luxembourg Gallery for the normal period, was shown in 1881. The year 1883 witnessed the production of "Doux Pays" for the Hôtel de Bonnat and "Le Rêve." In 1886 he decorated the Palais des Arts at Lyons with his celebrated paintings "Le Bois sacré, cher aux Arts et aux Muses," the "Rhône et la Saône, vision antique" and "Inspiration Chrétienne." In the following year he exhibited cartoons for the decoration of the grand hemicycle of the Sorbonne, which had been commissioned by the State at a fee of £1,400.

As this superb decoration is his *chef d'œuvre* some description of it is necessary. The painting represents "Literature, Science, and Art." It consists of one long panel divided into three parts by trees. In the centre is a figure on a throne. The figure, described by the painter himself as a "lay virgin," presides over all branches of knowledge and instruction. Calm and impassable, she reigns



STE. GENEVIÈVE.

(From the painting by Puis de Chavannes.)

gineer, sent him to the Polytechnic School in Paris, where, however, his studies were interrupted by illness. He then went to Italy, and on his return began his studies under Henri Scheffer and after-

supreme, her arms crossed, to indicate the impartiality which her majestic mission demands. On either side two spirits lean familiarly against her, awaiting her orders to carry palms and laurel wreaths to the worthy living and the illustrious dead. From a rock in front of the throne flows a spring of clear water representing Knowledge, the intellectual source of all ages of Life, from which children and an old man come to drink. "Then I had to represent Eloquence," said the painter; "for me she constitutes the highest expression of the power of the human spirit." Eloquence is represented by an upright female figure speaking with beautiful gesture. On either side of her are figures listening in admiration. These represent the various forms of human utterance:—Lyric Poetry, Epic Poetry, Drama, Satire, Fiction, and Comedy. Philosophy, divided into Materialism and Spiritualism—around which hover Pessimism and Doubt—comes next. A woman of severe countenance contemplates a skull which she holds in her hands. Her sorrowful look and her attitude of profound sadness express the idea that Death is the end of all things. Near her a beautiful young girl smilingly holds a flower, emblem of earthly joys. Spiritualism, an old woman, wrapped in a monastic mantle, replies with a gesture of ardent aspiration towards the ideal. Near by, Doubt, an old man, listens and reflects. Erudition is represented by a group consisting of a woman, in front of whom a child draws aside the branches of a bush exposing an antique inscription which the woman is about to transcribe on a tablet, and some workmen occupied in demolishing an old wall who stop to hear what History has to relate. To the right of the central group the Sciences are represented. These consist of Natural, Physical and Mathematical Science. Two female figures represent Geology and the Sea. They are simply draped in transparent veils, which permit admiration of their beauty. One is crowned with a coral diadem and holds a shell in her hand, whilst the other, adorned with precious stones, carries a crystal. Mineralogy is represented by a woman, old as the hills, seated on the ground, resting against a rock which contains a fossil shell. Botany carries a sheaf of flowers. Physics is represented by the mysterious Isis, who unveils to the initiated and to the ardent seeker after Truth. Mathematical Science is represented by three men absorbed in study of a geometrical problem. In the background is a semi-circular row of trees.

In 1890, on the secession of the Société des Artistes Françaises, Puvis de Chavannes assisted Meissonier in the foundation of the Société Nationale des Beaux-Arts, of which body he became president on Meissonier's death. In the same year he exhibited "Inter Artes et Naturam," which was painted as a decoration for the staircase of the museum at Rouen, to which were added in 1891 "La Poterie" and "La Céramique." In 1891 he painted "Été" for the Hôtel de Ville, in Paris, which was followed by "L'Hiver" in 1892, and "L'Hommage à Victor Hugo" completed the decoration of the Hôtel de Ville in 1893. The year 1895 saw the beginning of his decoration for the library at Boston, United States, "Les Muses inspiratrices

acclamant le génie messager de lumière," for which he eventually received the sum of £8,000. During 1897 and 1898 he completed the beautiful decorations of the Panthéon, which are among his best and most famous works. He died in Paris on October 24th, 1898, two months after the death of his wife.

Puy, LE, a town in the department of Haute-Loire, France, 65 miles S.W. of Lyons. Close by are Mont Corneille, on which is a colossal statue of the Virgin, and another volcanic cone, Le Rocher de St. Michel, supporting an ancient chapel. The cathedral dates from the 6th to the 12th century. The manufacture of lace and thread in various materials employs many thousands of hands and bell-founding and distilling are also carried on. Pop. (1901), 20,507.

Puy de Dôme, a department of Central France, bounded on the N. by Allier, on the S. by Haute-Loire and Cantal, on the E. by Loire and on the W. by Corrèze and Creuse. It has an area of 3,090 square miles and formed part of the old province of Auvergne. The name is derived from an extinct volcano, at the foot of which the capital, Clermont-Ferrand (52,017), is built. The ranges of the Monts Dore and Monts Dôme in the west and of the Monts du Forez in the east enclose the fertile plain of Limagne, which yields heavy crops of wheat, rye, barley, oats, potatoes, beetroot, mangolds and vines, besides fruits of all kinds. The mountain pastures support vast numbers of cattle and sheep. The district is drained by the Loire, with its tributaries the Allier, Cher and Gironde, and by the Dordogne and other smaller streams. Mineral springs of medicinal virtue attract many invalids to Royat, Mont Dore-les-Bains, La Bourboule and other thermal stations. Among the leading industries are wool- and cotton-spinning, cutlery, paper- and lace-making and leather-dressing. Pascal carried out in 1648 his observations concerning the weight of the atmosphere on the Puy de Dôme (4,806 feet) and an observatory was erected on its summit in 1876. Pop. (1901), 544,194.

Pyæmia, derived from Greek words signifying pus and blood, is the term applied to a febrile malady due to the entrance into the blood of septic or inflammatory material. The active cause of the mischief in such material is probably some form of micro-organism. Pyæmia occurs in connection with various kinds of injury, particularly compound fracture of the long bones. It is met with after surgical operations and as the result of certain conditions attended by inflammation, such as erysipelas, carbuncle, periostitis, etc. Puerperal fever is a form of pyæmia. The disease is often attended by the formation of secondary abscesses and to those cases in which no such secondary pyæmic formations occur the term *septicæmia* is sometimes applied. Cases of well-marked pyæmia frequently prove fatal; prompt surgical interference is sometimes, however, effectual in checking the progress of the malady.

Pycnogonida, a group of Arthropoda, the position of which is very doubtful, as it combines

the characters of the Arachnids and Crustacea. Thus, though they are all marine, they possess no special organs for respiration, while they have only eight legs, an Arachnid character. The embryos, when not internal parasites, closely resemble the larva known as Nauplii and this suggests that they are Crustacean. It is possible that the order is a primitive one resembling the ancestral form of both Crustacea and Arachnida. They are popularly known as Sea-Spiders; some genera, such as Nymphon and Pycnogonum, are not uncommon on the English coast.

Pye, HENRY JAMES, Poet Laureate, eldest son of Henry Pye, was born in London, February 20th, 1745, and educated at home and at Magdalen College, Oxford. He was made M.A., 1766, and D.C.L., 1772, and on the death of his father succeeded to his estate at Faringdon, Berkshire, and to debts amounting to £50,000. He joined the Berkshire Militia, became a county magistrate, and in 1781 was elected member for his county. He endeavoured to discharge his father's liabilities, but was eventually obliged to sell the estate. Appointed a police magistrate in 1792, his most useful work was a *Summary of the Duties of a Justice of the Peace out of Sessions* (1808). His ambition was to be known as a poet, and he assiduously cultivated verse writing and published many volumes. In 1790 he was made Poet Laureate, and on the King's birthday would yearly produce a loyal ode, packed with feathered songsters in noisy groves, which provoked the ridicule of George Steevens who wrote—

And when the *pie* was opened
The birds began to sing,
And wasn't that a dainty dish
To set before a king?

Sir Walter Scott said Pye was "eminently respectable in everything but his poetry." His tragedies and translations and his huge epic, *Alfred*, in six books, 1801, possessed no quality which could save them from oblivion. He died at Pinner, Middlesex, on August 11th, 1813.

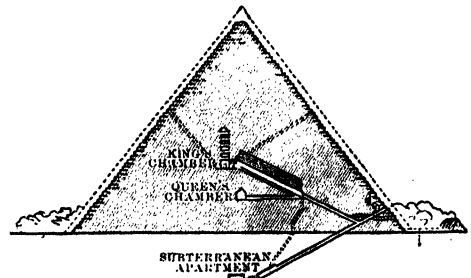
Pygmalion, a sculptor of the island of Cyprus, becoming a confirmed woman-hater, resolved to avoid matrimony and gave all his time and thought to his work. However, he became so enamoured of a beautiful figure which he had chiselled out of the marble that he prayed that it might be endowed with life. Venus accordingly changed the statue into a woman, whom Pygmalion married. There is no classical authority for calling her Galatea, but since her name is unknown it is hard to show that this might not have been hers. W. S. Gilbert turned the legend to account for his play, *Pygmalion and Galatea*.

Pylades. [ORESTES.]

Pym, JOHN, statesman, was born in 1584, at Brymore, near Bridgwater, Somersetshire, and was educated at Broadgates Hall, now Pembroke College, Oxford. He entered Parliament in 1614 as member for Calne, which he represented till 1625, when he sat for Tavistock. He made his mark as

one of the impeachers of Buckingham. He increased his reputation by his speeches during the debates on the Petition of Right and as leader of the popular party moved the impeachment of Strafford and was the chief manager of the trial in 1641 and also drew up the Grand Remonstrance in the same year. Pym was the chief of the five members whom Charles I. tried to impeach for treasonable correspondence with the Scots. After the failure of the attempt he became the most powerful man in the kingdom and was called by the Royalists "King Pym." Although a Presbyterian and not a man of extreme views, he retained his influence to the last and just before his death was made Master of the Ordnance. He lived to bring about that alliance with the Scots which was to be the deciding factor in the Great Rebellion. He died on December 8th, 1643, and was buried in Westminster Abbey, his body being ejected after the Restoration.

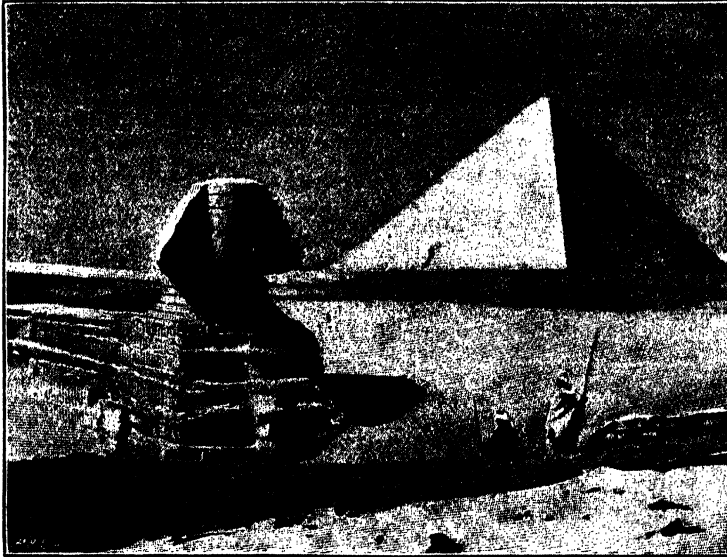
Pyramid, a structure with square base and triangular sides, which slope to an apex. Such structures have been erected at different times in various parts of the world, the most remarkable being those in Egypt. The name is Egyptian and strictly applies only to the slanting edge of the building, but was used by the Greeks (who converted *pir-em-us* into *pyramis*) of the whole structure. The Egyptian pyramids, of which there are some 70 or 80, occur in Middle Egypt alone. The finest examples are to be found at Gizeh, on the left bank of the Nile, nearly opposite Cairo and not far from Memphis. The Great Pyramid of Cheops (Chufu) was built about 3666 B.C. It was originally 481 feet high on a base 774 feet square, but many of its stones were removed for mosques and other buildings in Cairo. The figure of the Sphinx adjoins it. The Second Pyramid of Chafra or Chephren is 450 feet high on a base



SECTION OF THE GREAT PYRAMID.

of 700 feet square (3633 B.C.). The other pyramids at Gizeh are much smaller. There can be little doubt that their sole purpose was to commemorate the kings above whose sepulchres they stand. These monarchs belonged to the various dynasties from the 4th to the 12th and lived between 4000 and 2000 B.C. The first step in the construction of the pyramids, which were invariably built during the lifetime of those for whom they were intended, was the excavation of the gable-roofed, subter-

anean chamber designed to hold the sarcophagus. When it was finished horizontal layers of roughly-hewn blocks of stone, with some mortar, were placed over it, the opening through which the sarcophagus was to descend being left uncovered. The rubbly character of the pyramids gradually increased, till eventually the greater part consisted of mud bricks; but even the latest specimens retained the outer casing of highly-finished stone



THE GREAT PYRAMID AND SPHINX.
(Photo: D. Bates, Stockport.)

work which completed the structure. In most cases this has now disappeared, having been either destroyed by foreign invaders or carried away to erect buildings in the Egyptian towns. The faces of the pyramids look towards the cardinal points, the entrance to the passage which leads to the sepulchral chamber being either in the northern face or in the ground in front of it. The way through the passages was barred by portcullises, the secret of opening which was probably known to the priests alone. The sepulchral chamber is sometimes situated within the body of the pyramid, instead of underneath it, and sometimes there is more than one, as, for example, in the Great Pyramid of Gizeh, the internal arrangements of which are quite exceptional.

Pyramids, a game of skill played on a billiard table. Fifteen red balls are arranged on the table in the form of a pyramid, the striker's ball being white and used by both players alike. The aim is to pocket the greatest number of balls. Play begins from baulk, but afterwards from the place where the white ball stops. When a player holes a ball he plays on any other ball he chooses, scoring one

for every pocketed ball. Should he miss or run in his adversary will score one and play from baulk. When only two balls remain on the table, the white and red are played with alternately. **SNOOKER** is a variety in which some of the pool balls are used, these being placed on different spots and carrying values according to their order on the scoring-board. A pyramid ball (any) must first be played on and, should this be holed, the player will then play on a pool ball. Should this be pocketed it is placed again on its original spot and the striker next plays on a pyramid ball. A run in or miss is scored to the ball played on (that is, to an opponent). All the pyramid balls having been holed, the pool balls are played on in the sequence of their colours, but when holed are not replaced. A player is snookered when a ball intervenes between his own and the object ball. The only way of hitting the latter is by angle-play off the cushion. If the player fail to accomplish this or strike another ball he loses a life.

Pyramus and Thisbe, two Babylonian lovers whose tale is told in Ovid's *Metamorphoses* and best known from Shakespeare's *A Midsummer Night's Dream*. Pyramus, finding one night his mistress's robe stained with blood, concluded she was dead and killed himself; and Thisbe, who had fled from a lioness, when she found his dead body, also put an end to her life.

Pyrenees, THE, a range of mountains, about 270 miles in length and 90 miles in breadth, which stretches from the Bay of Biscay to the Mediterranean and divides France from Spain. The range occupies an area of 21,044 square miles, of which 14,654 square miles belong to the southern, and 6,390 square miles to the northern slope. The height is remarkably uniform (mean, 3,980 feet), the chief peaks—such as Maladetta or Nethou (11,165 feet), Possets (11,047 feet), Mt. Perdu (10,994 feet) and the Vignemale (10,820 feet)—being west of the central point. On the French side the ascent is very gradual, but the Spanish face offers steeper precipices and presents scenery of surpassing grandeur and boldness. Of rivers rising in the range, the Adour, Garonne and Aude flow northwards; the Llobregat and numerous tributaries of the Ebro (Aragon, Noguera, Segre) southwards. Very remarkable are the *cirques* or

circular basins of the upper valleys of the smaller streams, that of Gavarnie being the most famous. Many *ports* or passes traverse the range, but few are practicable for carriages. The Col de Portus (Perthus) from Perpignan in France to Figueras in Spain is interesting as being the route taken by Hannibal in 218 B.C. Geologically the Pyrenees consist, like the Alps, of a granite base capped by various sedimentary strata, from the Cambrian to the Tertiary periods, limestones largely predominating.

Pyrénees-Basses (LOWER), a department of South-Western France, bounded on the N. by Landes and Gers, on the S. by Spain, on the E. by *Pyrénees-Hautes*, and on the W. by the Atlantic. It has an area of 3,000 square miles. The mountains towards the west seldom exceed 3,000 feet in elevation, but rise gradually in the east to 8,000 or 10,000 feet, as in the case of Anie, Mourous and Ossau. The valleys, in spite of excessive humidity, are fertile, producing wheat, maize, potatoes, wine, chestnuts and vegetables, whilst there is good pasturage for cattle and sheep. Copper, iron and salt are worked. Mineral springs exist at Eaux Bonnes, Eaux Chaudes, Cambron and other places. Pau (31,692), the capital, Biarritz (12,812) and St. Jean de Luz, on the coast, are well-known health-resorts, and Bayonne (27,601) is the only commercial port. Pop. (1901), 426,347.

Pyrénees-Hautes (UPPER), a department of South-Western France, bounded on the W. by *Pyrénees-Basses*, on the S. by Spain, on the E. by Haute-Garonne, and on the N. by Gers. It has an area of 1,750 square miles. Within its borders are found the highest peaks of the Pyrenees, and the southern half is extremely wild and rugged, but fertile valleys open out to the north. The principal streams are the Adour and its affluents the Arros and Gave de Pau. Wheat, oats, maize and potatoes are the chief crops, but the vine and walnut are extensively cultivated, while the hill pastures sustain large numbers of live-stock. Marble is quarried. Mineral springs exist at St. Sauveur, Barèges, Cauterèts and Bagnères de Bigorre, which with Lourdes (a famous place of pilgrimage), Argelès, and Tarbes (26,055), the capital, are the chief towns. Pop. (1901), 212,173.

Pyrénees-Orientales (EASTERN), a department in Southern France, bounded on the N. by Ariège and Aude, on the E. by the Mediterranean, on the S. by Spain, and on the W. by Ariège. The area of 1,592 square miles is divided by the *Albières*, the *Corbières*, and the branches of the Pyrenees (highest point, Canigou, 9,137 feet) into three valleys, running east and west and merging towards the north-east in a wide plain. Good crops of rye, oats, maize, potatoes, olives and fruits are produced, but viticulture is the principal source of wealth, the wines of Roussillon and Rivesaltes being much esteemed. Live-stock are raised in considerable numbers, as well as silkworm cocoons. Iron and lignite are mined. The climate and products, especially in the coast districts, are those of Corsica and Italy. There are no good harbours, the coast

being fringed with shallow sandy lagoons. Port Vendres and Banyuls-sur-Mer enjoy the largest share of the traffic. Perpignan (36,157) is the capital, Céret, Rades, and Amélie-les-Bains being towns of minor importance. Pop. (1901), 212,121.

Pyridine, an organic compound of the composition C_5H_5N . The constitution is closely analogous to that of benzene, the nitrogen atom replacing one of the CH groups of that compound. It closely resembles benzene also in very many of its chemical reactions. It occurs with other derived substances in coal-tar and to a greater extent in "bone-oil" or "Dippel's oil." In its chemical behaviour it plays the part of a basic substance and is an example of the substances known as organic bases. It is a limpid, colourless liquid which boils at 115° . It mixes with water in all proportions, has a pungent smell and possesses a specific gravity of 1.003. It gives rise by substitution of some of the hydrogens, or by addition of other elements or groups, to a large number of derivatives. It is of great chemical interest owing to the fact that many of these derivatives are closely allied to some of the substances known as alkaloids, while many of the compounds which have attracted considerable attention, the ptomaines, have been shown to be also pyridine derivatives.

Pyrites, a term (derived from the Greek *pur*, "fire") originally applying only to the hard iron-disulphide (FeS_2) which would strike a light with flint or steel, but afterwards extended to various other metallic sulphides, such as copper-pyrites, arsenical-pyrites, etc. Iron-pyrites occurs as two distinct mineral species: the more readily decomposed prismatic marcasite and the cubic pyrite, the mundic of miners. The latter is of a brass-yellow colour and crystallises in pentagonal dodecahedra, cubes and combinations of the two, the faces of the cube being striated parallel to the edges of the dodecahedron. It was formerly used in wheel-lock guns as a strike-light; but though nearly half iron, is, on account of the sulphur, of little value as a source of iron. It is worked for sulphur and used in the manufacture of sulphuric acid. A cupreous variety, with under 3 per cent. of copper and traces of gold and silver, occurs in enormous deposits at Rio Tinto and elsewhere in the province of Huelva in Spain and in Portugal, at the junction of intrusive igneous rocks with Devonian slates. Several hundreds of thousands of tons are imported annually into Great Britain mainly from this part of the Peninsula.

Pyrogallic Acid, a compound known chemically as a trihydroxy benzene, being represented by the formula $C_6H_3(OH)_3$. It is hence an example of a trihydric phenol. [PHENOLS.] It is obtained by heating gallic acid, when the compound breaks up into pyrogallic acid and carbonic acid—



It forms white leafy crystals which melt at about 115° . It is very soluble in water and the solution possesses the property of absorbing oxygen. Owing to this it is largely employed in gas analysis to

estimate the quantity of oxygen in a gaseous mixture, the diminution of volume in the gas when shaken with a small quantity of a solution of pyrogallie acid being equal to the volume of oxygen originally present. Large quantities are employed in photography, as it forms a "developer" which, if carefully used, is certainly unsurpassed by any of the newer chemicals employed for the same purpose.

Pyrolusite, an ore of manganese, consisting chemically of the dioxide of that metal, MnO_2 . It occurs in large masses and also in rhombic crystals. It possesses a specific gravity of about 4.8 and a hardness of about 2.5. It was for a long time considered to be an ore of iron and its true nature was first demonstrated by the Swedish chemist Karl Wilhelm Scheele (1742-86). It was used at a very early date in glass-making for the purpose of decolorising glass rendered green by iron. It was formerly termed *magnesia* or *lapis manganensis* and only incompletely distinguished from the loadstone or magnes. It is employed chemically as a source of oxygen and in preparation of chlorine in the manufacture of bleaching powder. It is also used in glass-making and as a source of the manganese compounds. The principal localities where the mineral occurs are Bohemia, Spain, France, the United States and Nova Scotia, whilst small quantities are found in Devonshire. As obtained naturally it is seldom pure, being usually mixed with oxides of iron, nickel and cobalt.

Pyrometer, an instrument for measuring very high temperatures and specially required to measure the heat of furnaces. An air or gas thermometer is sometimes used, the temperature being calculated from the expansion undergone by the gas, the pressure being constant, or from its increased pressure at constant volume. A simple form of it consists of a bulb (of glass or some other suitable material) which is drawn out into a fine neck. It is filled with dry air, exposed to the heat of the furnace and, when it has attained this temperature, the neck is sealed up with a blowpipe. It is removed, allowed to cool and the point of the neck broken off under mercury. This liquid rises into the bulb, the levels of the mercury inside and outside the bulb are equalised, the opening is temporarily closed and the bulb with the mercury it now contains is weighed. This weight, together with the weight of the bulb when full of mercury, are data from which the expansion of the air and hence the temperature can be deduced. Hydrogen, nitrogen, mercury vapour and iodine vapour have in their turn all been used instead of air. Another method of measuring high temperatures is to expose pieces of various alloys to the heat of the furnace and note which of them melt, the melting-points of these alloys having been previously determined. Prinsep arranged a series of such alloys (of silver, gold and platinum), whose melting-points ranged from 945° to $1775^\circ F$. Again, a piece of platinum may be exposed in the furnace for some time and then plunged into water in a calorimeter. From knowing the specific heat of platinum for a long range of temperatures and by

noting the temperature to which this piece raises the water, the temperature of the furnace can be calculated. Measurements of the expansion of earthenware or metal rods have also been used, the most successful being Bregnet's device, in which strips of gold, silver and platinum are fastened together in a spiral, whose end moves as the temperature alters. In electric pyrometers a spiral of platinum wire is heated in the furnace, the temperature of which is estimated from the alteration in its resistance.

Pyromorphite, an ore of lead consisting of a double phosphate and chloride of that metal, represented by the formula $Pb_3(PO_4)_2Cl$. It is interesting on account of its isomorphism with the minerals apatite and mimetosite. It is not employed as a source of the metal. It occurs chiefly in hexagonal crystals of hardness 4 and specific gravity about 6.8.

Pyrosis, or WATER-BRASH, a symptom of indigestion, in which there rises from the stomach into the mouth a clear watery fluid, usually tasteless, but sometimes mixed with acid gastric juice. The quantity may amount to only a few teaspoonsfuls or to several pints. There is severe tight spasmodic pain at the pit of the stomach, with a feeling of nausea, ending in the retching of the fluid. It is generally caused by bolting meals of irritating indigestible food and the condition will disappear when this habit and dietetic errors are corrected. The food should be nourishing, easily digestible and properly masticated. For a time, if necessary, a bismuth mixture may be taken thrice a day before meals.

Pyrotechny, the art of producing an attractive scenic display by the application of fire. Fireworks have been known to the Chinese from a very remote period, but the first attempt to construct them in Europe was the result of the invention of gunpowder in the 13th century. To produce the desired result there must be a combination of combustible or oxidisable materials, such as carbon and sulphur and their compounds, with substances which promote their speedy combustion, such as nitrate and chlorate of potash, the oxygen contained in these salts occasioning the rapid consumption of the forementioned materials when fire is applied. The variety in colour, on which the beauty of fireworks chiefly depends, is produced by means of simple metals, compounds of which are introduced as ingredients into the mixture. The compositions which have been described are placed in cases of paper or pasteboard—usually cylindrical in form—the construction of which requires great care. A due relation must be observed between the length and the diameter and it is essential that the aperture through which the burning materials are to escape should be of the right size. Most fireworks are capped with touch-paper, prepared with a solution of nitrate of potash in alcohol, a quick-match of cotton-wick being used to unite the parts of complex designs and portfires containing saltpetre and similar materials to set fire to the cappings.

Pyroxene, a group of silicates of magnesium, calcium, iron and sodium, with or without aluminium, so named from their infusibility. Though almost identical in composition with hornblendes, they differ in not being pleochroic and seem to have resulted from more rapid cooling. Some of them, such as augite and diallage, crystallise in the Oblique system, but in forms unlike those of the hornblendes. Others, such as hypersthene, enstatite and bronzite, belong to the Prismatic system and are known collectively as Rhombic pyroxenes. Pyroxenes occur in diabase, basalt, gabbro and other basic lavas, seldom associated with either quartz or orthoclase.

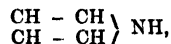
Pyrrhic Dance, the most celebrated war-dance of the ancient Greeks. It consisted of quick steps and adroit movements of the body, the idea being to represent the attempt to strike at an adversary and to elude the blows supposed to be given in retaliation. The dancers carried their weapons and the practice was regarded as training for actual service. The dance (much in favour among the Spartans) was accompanied on a flute. It was named after its inventor, Pyrrichus, although one authority derives it from *pura* ("funeral pyre"), because the dance was, according to this theory, first performed at the funeral of Patroclus.

Pyrro, the earliest but not the last of the great Philosophic Doubters, was born at Elis in the west of the Peloponnesus, Greece, about 360 B.C. He accompanied Alexander the Great in his Indian expedition, along with Anaxarchus, the Democritean philosopher, said to have been his master. He spent the rest of his days in his native city, poor but respected, and died about 270. He was the earliest of sceptical thinkers, "Pyrrhonism" having become a proverbial appellation, but he left no writings. What we know of his doctrine is derived from his pupil Timon of Philus (325-235 B.C.). Pyrro taught that as much is to be said for as against any opinion whatever, that neither the senses nor reason can be trusted, that when we are really convinced we can know nothing we cease to care and that in this way only can be attained true happiness. It is said that he took no obvious precautions such as getting out of the road of vehicles; but this savours of fatalism rather than scepticism, and an unphilosophical chauffeur would make mince-meat of the opinion or its holder.

Pyrrhus, the great king of Epirus, was born about 318 B.C. and succeeded to the throne in 295. Fifteen years later he took the part of the Greek colonies in Italy against Rome and invaded Italy. By the help of his elephants, which the Romans had never yet met with in battle, he was at first victorious, though the heavy losses he sustained brought into use the expression "Pyrrhic victory." After having, however, concluded a truce with Rome, he turned his arms against the Carthaginians in Sicily and received from them a check at the siege of Lilybeum. This was followed by the loss of many of his ships and, on renewing the war with Rome, he was totally defeated near Beneventum by Curius Dentatus (274). After his return to

Epirus, Pyrrhus conquered Macedonia, but was unsuccessful in a war with Sparta and, while besieging Argos in 272, was killed by a tile which a woman threw from a roof.

Pyrrrol, a compound of the composition C_4H_5N , occurring in coal-tar. It gives rise to a number of derivatives which more or less resemble those of benzene. In its nature pyrrol is of a slightly basic character. It occurs in bone-oil and may be prepared synthetically. These synthetic formations, as well as the reactions of the compound, show that its composition must be represented by the formula



i.e., a chain of four CH groups closed by the group NH. It is a colourless liquid, which becomes coloured, however, if allowed to stand in contact with air. It boils at about 131°F . and the substance itself, as well as its derivatives, is recognised by the formation of a deep indigo colour with isatin and sulphuric acid.

Pythagoras, the Greek philosopher, was born in Samos, an island of the Aegean, about 582 B.C. He seems to have travelled widely and to have acquired a knowledge of the then existing Greek philosophy as well as of the religious systems of the Egyptians, the Persians, the Phœnicians and the Jews. About 530 he settled at Crotona in the south of Italy. Here the Pythagorean philosophy grew up. Politically its votaries became the aristocratic party and after a period of domination they were defeated. Their leader is said to have died at Metapontum at the end of the 6th century B.C. Our knowledge of Pythagorean doctrines is derived chiefly from Philolaus, a successor of Pythagoras. Their central doctrines were those of the Transmigration of Souls and the Doctrine of Numbers, as well as the poetic notion of the Harmony of the Spheres.

Pythias. [DAMON.]

Pythian Games, THE, ranked second to the Olympic among the four national festivals of the ancient Greeks. They were established in 586 B.C. and took place in the third year of each Olympiad on the Crissean Plain near Delphi, in Phœcia. The gymnastic and athletic contests were less important than the musical ceremonies, the chief of which was the Pythian *nomos*, a composition for the flute commemorating the victory of Apollo over the dragon Python.

Python, a genus of Old World serpents closely allied to the Boas of the New World, the type of a family (*Pythonidae*). They are not venomous, but kill their prey by crushing it between the folds of their body. The tail is prehensile and there are traces of rudimentary hind limbs. Pythons are found in Asia, Africa and Australasia, generally near water, which affords them an opportunity of seizing small mammals as they come to drink. There is no truth in the story that these serpents cover their prey with saliva before swallowing it;

but after a full meal they sink into a torpid state. Some, if not all, incubate their eggs. Specimens of from eighteen to twenty feet long are rare, though still larger ones are said to have been met with, but the average size is much smaller. Their skin is beautifully marked.

Pyx (Greek *pyxis*, "box"), the vessel in Roman Catholic churches in which the consecrated bread is preserved. A lamp burns before it when the Host is inside. The pyx is now often made much smaller and flat and round like a watch-case, for convenience in conveying the sacrament to the dying.

Pyx, TRIAL OF THE, an annual trial held at Goldsmiths' Hall, in London, to test by weight and assay the quality of the gold and silver coins issued from the Mint during the previous year. The pyx is the box in which the specimen coins reserved for trial are kept, one coin being selected at random out of every fifteen pounds (troy) of gold and one out of every sixty pounds (troy) of silver minted. The verdict is delivered by a jury of goldsmiths, headed by the King's Remembrancer, which reports to the Treasury.

Pyxidium, in botany, a seed-vessel, commonly a capsule, with the top falling away like a lid, as in the Henbane.

Q

Q, the 17th letter of the English alphabet, originated in the hieroglyphic symbol of a knee. Through the Phœnician *qoph* it passed into the Greek alphabet as the velar guttural *koppa* (*kw*), which was afterwards supplanted by the palatal *kappa* (*k*), surviving only as the symbol for 90. But amongst the Romans, who found it in the Chaldeian alphabet of Cumæ, it secured a lasting position. It made its way into Teutonic words very gradually; thus, in Middle English words of Saxon origin the sound is represented by *cw* till the latter part of the 13th century. In English it occurs only before a *u* that is followed by another vowel. The *qu* is pronounced either as *kw*, or as *k*, the *u* being silent, as in "pique." Most words containing *qu* are of Latin or French origin, saving a few Saxon ones, simple and strong, like "queen," "quick," "quoth."

Quadragesima (Latin, "fortieth"), the annual Lenten fast in the Christian Church. It begins on Ash Wednesday, the forty-sixth day before Easter, when it ends. Sundays being always regarded as feast days, the Sundays in Lent are not reckoned in the computation and thus the duration of the fast is reduced to forty days. The French term *carême* implies the same thing. Quadragesima Sunday is the first Sunday in Lent.

Quadrant, the fourth part of a circle, subtending an angle of 90° at the centre. The word has also been applied to an astronomical instrument for measuring the zenith distances of stars, etc. It is placed in the plane of the meridian and

generally attached to a wall; hence it is often known as a mural quadrant. A telescope movable about the centre of the quadrant is provided with a vernier and moves over the divided arc whose zero is the end of a vertical radius. Tycho Brahe used a quadrant also for measuring azimuths and in this case it was adjusted on a vertical axis. In modern times the quadrant has been almost entirely superseded by the mural circle, in which much greater accuracy can be obtained, even though the instrument itself be smaller. In the quadrant error, due to the centre of revolution not coinciding with the centre of the division, is certain to occur; but in the mural circle this is at once eliminated by taking readings on two opposite verniers. The quadrant invented by John Hadley in 1730 is now usually known as Hadley's sextant.

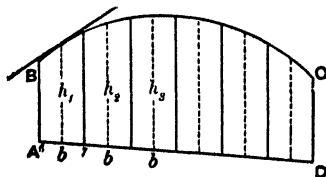
Quadratic Equations. [EQUATIONS.]

Quadrature really means the determination of a square whose area shall be equal to that of any given surface. The area of such surface can, however, be found without the actual determination of the equivalent square; hence the term quadrature is now applied to any process which gives a means of expressing the area in terms of any definite unit. The quadrature, or squaring of the circle, is a problem which has excited much attention from most remote times and is often classed with that of finding perpetual motion. Since the area of the circle could be expressed in terms of the radius and circumference, the problem really became to find geometrically a straight line equal to the circumference, or to find the ratio π between circumference and diameter. Many people, ignorant of the nature of the problem, have believed that they have "squared the circle" in some simple way; but Lambert and others proved—what was long suspected—that the number π was incommensurable. One geometrical method of approximation is to inscribe a square in a circle and to add one-fifth of the side of the square to three times the diameter of the circle. A curious method adopted by Archibald Smith and others was to toss a thin rod many times on a level floor on which a number of parallel lines were drawn at equal distances. If the length of the rod be c and the distance between the lines be d , the probability that the rod will lie across a line is $\frac{2c}{\pi d}$. By actually counting the

number of times that this result occurred in 3,200 tosses the value 3.1553 was obtained for π . For a general discussion of the subject the reader is referred to *Mathematical Recreations and Problems* by W. W. R. Ball.

Quadrature, METHODS OF. When the surface whose area is required is bounded by straight lines, the area can be found simply by splitting it up into triangles. [MENSURATION.] The areas of segments of some curves are also easily found; for example, the area of a parabolic segment is equal to two-thirds that of the triangle whose sides are the chord of the segment and the tangents at its extremities, or four-thirds that of the triangle on the same base, but whose vertex is the point on

the curve cut by the diameter, through the point of intersection of the tangents. For any curve the following method is applicable: Divide the base into a number of equal parts b and erect ordinates at the points of division. Let ordinates (represented by the dotted lines in the accompanying diagram) also be erected half-way between these others, their heights being h_1, h_2, h_3, \dots . The product $b h_1$ represents the area formed by the figure on base b , whose sides are the two first ordinates produced to meet the fourth side, the tangent at the top of h_1 . Hence the area of the figure $ABCD$ is rather less than $b(h_1 + h_2 + h_3 + \dots + h_n)$, but this expression becomes nearer the true value



the smaller we take b . If b is so small that it can be written dx and the ordinates are different values of y , the expression for the area may be written $\int y dx$ between the limits $y = AB$ and $y = DC$. In some cases this integral cannot be definitely determined, but different methods of approximation can be found. In Simpson's method for determining areas, small parts of the curve are considered as arcs of a parabola, whose axis is taken parallel to the ordinates, the base being divided into an even number of equal parts. A rough approximation to the area of any surface may be obtained by cutting the surface out in uniformly thick paper, weighing it and comparing it with the weight of a known area.

Quadric Surface is one which can be cut by any straight line in two points. It is, therefore, a surface of the second order and any plane section of it is a conic, those sections given by parallel planes being similar to each other. The following are examples of quadric surfaces:—

- (1) Ellipsoids including prolate and oblate spheroids, with the sphere as a special case.
- (2) Hyperboloids of one sheet and of two sheets with the cone as a special case.
- (3) Cylinder on elliptic, circular or hyperbolic base, which may reduce to a pair of intersecting planes.
- (4) Elliptic and hyperbolic paraboloids.
- (5) A cylinder on parabolic base.
- (6) A pair of parallel planes.

Quadrille, a card-game, much in favour in the 17th and early part of the 18th centuries. It was played by four persons with forty cards (a pack from which the eights, nines, and tens have been removed). The ascendancy of whist eclipsed it.

Quadrille, a square dance, introduced into England from France about 1800. It is danced by four couples—one pair at the top of the set, one

facing at the bottom, and one pair at each side. The evolutions are mostly performed inside of the square. It consists of five figures, each complete in itself, which were known by their French names of *Le Pantalon*, *L'Été*, *La Poule*, *La Trénise* (or *La Pastourelle*) and *La Finale*. Usually the figures are danced by the top and bottom couples and then by the sides. It is often regarded as old-fashioned and has been largely superseded by the more modern *Lancers* and *Cotillon*.

Quadrivium, an affected use of the Latin word meaning "a place where four ways meet," which, in this particular case, was Mathematics. In the Pythagorean system this comprised arithmetic (treating of number in itself), music (applied number), geometry (stationary number) and astronomy (number in motion). Thus the trivium of the Schoolmen of the Middle Ages—grammar, logic and rhetoric—followed up by the quadrivium, as described, composed the ancient scheme of liberal education.

Quadroon, the offspring of a mulatto and a white person. Persons having one-fourth of negro blood were not uncommon in the Slave States of the American Union. In *Some Reminiscences* W. M. Rossetti describes Alexandre Dumas, the author of *Monte Cristo*, as "the most goodnatured-looking and the most illustrious of quadroons."

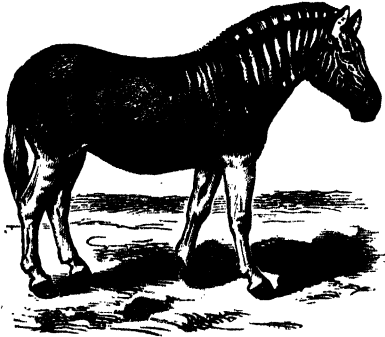
Quadrumania (Latin, "four-handed"), Cuvier's name for an order of Mammals, containing the apes, monkeys and lemurs, so called because these animals use their hind as well as their fore feet as hands.

Quadruple Alliance, the league formed on August 2nd, 1718, between Great Britain, France, Austria and Holland to check the vaulting ambition of Cardinal Alberoni, Prime Minister of Philip V. of Spain. After the British fleet under Admiral Sir George Byng (afterwards Viscount Torrington) had destroyed the Spanish off Cape Passaro (July 31st, 1718) and the French had defeated the Spanish forces several times by land, Philip V. came to his senses, dismissed Alberoni and accepted the terms of the Quadruple Alliance in January, 1720.

Quæstor, the title of a Roman magistrate, whose chief duty, in the later days of the Republic, was the superintendence of the public treasury. It ranked lowest among the great magistracies and was consequently held by all politicians at the outset of their career. After 421 B.C. plebeians were eligible for the office. In the same year two new quæstors were added to the original couple. The number was increased to eight about 267, and to 20 in 81 B.C. The quæstors held office for one year, but when it became customary for the consul (or prætor) to be granted a province as proconsul (or proprætor) after the expiration of his term, the quæstor also retained his position with the title of proquæstor.

Quagga (*Equus quagga*), a striped wild ass, found, even so recently as the middle of the 19th century, in immense herds within the Cape Colony,

Orange Free State (afterwards the Orange River Colony), and part of Griqualand West, but now probably extinct, having been ruthlessly slaughtered for their hides. The head, neck and upper part of the body were reddish-brown, with irregular dark-brown stripes on the head and neck, gradually growing fainter—the body being nearly and the hind quarters entirely self-coloured. In general appearance the quagga resembled the horse more than the ass, especially in the ears and tail; but, like the ass, it had no callosity on the inner side of the hind legs. The name, derived from the shrill barking neigh of the animal, is sometimes given to *E. burchelli*. Although it never mixed with the zebras, it was almost invariably to be seen in the



QUAGGA.

company of the white-tailed gnu and the ostrich, evincing for the society of the bird especially a remarkable predilection.

Quail, a bird belonging to the genus *Coturnix*, with six species, of the Partridge family (*Perdidae*), of which they are the smallest members. They range over the Palaearctic, Ethiopian and Oriental regions to New Zealand. The Common Quail (*C. communis*)—the bird on which the Children of Israel fed in the wilderness—is about seven inches in length, the female slightly larger, and in general form resembles a very small partridge. The plumage is brown with buff markings, and on the throat of the male are two dark-brown streaks descending from the ear coverts and in the second year ending in a blackish patch. The Quail is a British visitor, arriving in April and generally leaving in November, though some stay throughout the winter. In their northward migration immense numbers pass over the south of Europe and multitudes are netted for the market, the flesh being highly valued for the table. They are of very rapid flight, accomplishing long and fatiguing journeys. Quails are pugnacious birds and the males are sometimes polygamous. The nest, generally a depression in a green cornfield, contains from seven to fourteen eggs. The young are soon able to follow the old birds and feed upon grain, insects and tender leaves. The Californian Quail (*Lophortyx Californianus*) has a beautiful head-crest and a rich admixture of colour in its

plumage. It swarms in the woods and on the bushy plains and hill-sides.

Quain, JONES, anatomist, was born in 1796 in county Cork, Ireland, and was educated at Fermoy and Trinity College, Dublin, where he studied medicine. After a few years in Paris and other Continental schools, he settled in London and wrote the *Elements of Descriptive and Practical Anatomy* (1828), which made his reputation and became the standard text-book on the subject. In 1831 he was appointed to the chair of Anatomy in University College, London, a post he resigned in 1835, when he was elected a member of the Senate of London University. He died in London on January 31st, 1865.

Quain, RICHARD, surgeon, brother of the preceding, was born at Fermoy, county Cork, Ireland, in July, 1800, and was educated at Adair's School in Fermoy. He proceeded to the Aldersgate School of Medicine in London to prosecute his scientific studies, which he continued in Paris. In 1832 he was appointed Professor of Descriptive Anatomy in University College, London, and in 1848 took the chair of Clinical Surgery. He was elected F.R.C.S. in 1843 and F.R.S. in 1844, was President of the Royal College of Surgeons in 1868, and delivered the Hunterian oration in the next year. When he died in London on September 15th, 1887, he held the position of Surgeon-Extraordinary to Queen Victoria. He left £75,000 to University College to promote education in modern languages and natural science, the Quain Professorship of English Literature and the Quain studentships being founded out of the bequest. His chief work was *The Anatomy of the Arteries of the Human Body* (1844).

Quain, SIR RICHARD, physician, cousin of the preceding, was born at Mallow, county Cork, Ireland, on October 30th, 1816, and was educated at Cloyne, Limerick and University College, London, where he graduated M.D. in 1842. In 1861 he became F.R.C.P. and, in 1855, Physician to the Brompton Hospital for Chest Diseases. He was Crown nominee on the General Medical Council in 1863 and, as secretary of the revising committee, was closely associated with the successive issues of the British Pharmacopœia. He was elected F.R.S. in 1871. As Lumsleian lecturer (1872) he discussed the diseases of the muscular walls of the heart, and as Harveian orator (1885) he reviewed the healing art in its historic and prophetic aspects. In 1891 he was elected President of the General Medical Council, being re-elected on the expiry of his office in 1896. Among his patients were Thomas Carlyle and his wife, and Sir Edwin Landseer. He was the editor of the well-known *Dictionary of Medicine*, first published in 1882. He was created a baronet in 1891, and died in London on March 13th, 1898.

Quakers. [FRIENDS.]

Qualitative Analysis is that branch of analytical chemistry which treats of the determination

of the elements present in a chemical, but does not deal with the quantities. The methods employed are usually the application of a number of tests to a solution of the substance to be examined, the tests being applied in a regular order, so that some of the constituents of the compound are obtained in an insoluble form and so separated. As an example of the methods, if hydrochloric acid be added to a solution of silver, lead and mercurous salts and chlorides of these metals will be precipitated. The precipitate is boiled with water, when the lead chloride is dissolved and filtration leaves only the silver and mercurous salts. Adding ammonia effects the solution of the silver and leaves the mercurous chloride as a blackened insoluble mass. By filtering again, therefore, the complete separation of the three salts is effected. The filtrate obtained from the hydrochloric is again treated in an analogous manner until all the metals present are determined. Other tests are applied for the acids. Tests in which flame colorations are used are also available, as well as numerous dry reactions in which the salts are heated mixed with suitable reagents. In the case of organic chemistry the qualitative analysis consists for the most part of a number of separate tests to determine the presence of suspected elements.

Quantitative Analysis is the determination of the quantity of all or some of the elements present in a known weight of the compound examined. In inorganic chemistry two methods—volumetric and gravimetric—are generally employed. In the latter the element required is separated in the form of some compound—usually insoluble, which can be thoroughly dried by heating and the weight of which can be determined. In the volumetric method use is made of some reaction which takes place on the addition to the solution to be examined of another standard solution, of which reaction the end point can be determined. Thus if an acid has to be determined, a solution containing a known quantity of alkali is added slowly. Some litmus is also placed in the vessel and is of a red colour, but as soon as the quantity of alkali added is just more than sufficient to neutralise the acid the litmus will be turned blue. From the quantity of alkali added then the amount of acid present is determined. In organic analysis the estimation is usually performed by combustion, the carbon and hydrogen being completely oxidised to carbonic acid and water and the weight of these substances determined. Other elements present require other and special treatment.

Quarantine, a period during which a vessel coming from a town or country where a virulent contagious disease (cholera, plague, yellow fever) is more or less epidemic is forbidden to discharge passengers, crew, or cargo until she has received a clean bill from the port sanitary authority. Originally this period extended to forty days (hence the name), but in modern practice the tendency is to give the local sanitary authority full powers to release all clean cases and goods after the exercise of ample precaution and disinfection, detaining only the doubtful or infected cases. During quarantine

a clean ship shows a yellow flag, but a stricken vessel a yellow and black one. Such diseases as smallpox, scarlet fever, diphtheria and others of an infectious and contagious character have now to be notified to the medical officer of health, who may require the family concerned to submit to what amounts to a sort of quarantine, besides taking steps to isolate the case.

Quarles, FRANCIS, poet, was born at Romford, Essex, England, on May 8th, 1592, and was educated at a country school and Christ's College, Cambridge. He was a man of marked piety and literary ability which took a turn for lugubrious verse. He held the offices of secretary to Archbishop Ussher (with whom he lived in Dublin) and chronologer to the City of London (1639). He sided stoutly with Charles I. in his Parliamentary troubles, but did not live to see the King's fate. He died in the City of London on September 8th, 1644. He had no fewer than eighteen children. His chief poetical work was *Divine Emblems* (1635), to which was added in 1638 *Hieroglyphikes of the Life of Man*, and in 1645 (posthumously) *Solomon's Recantation*. The *Enchiridion* (1640), containing aphoristic essays and meditations, was his most popular prose-work.

Quart, a measure of capacity; the fourth part of a gallon. It contains about 69·3 cubic inches.

Quartan Fever. [AGUE.]

Quarter, a measure of weight. It contains 28 lbs. avoirdupois and is the fourth part of a hundredweight. It is also used as a measure of capacity, being equivalent to eight bushels.

Quarter-Day, in England, the day that begins each quarter of the year. They are Lady Day (March 25), Midsummer Day (June 24), Michaelmas Day (September 29), and Christmas Day (December 25). In Scotland the terms are Candlemas (February 2), Whitsunday (May 15), Lammass (August 1) and Martinmas (November 11), the removal terms being May 28 and November 28. When a Scottish term falls on Sunday, the following day is considered as term-day.

Quarterly Review, THE, is the famous periodical started in 1809 (February) by John Murray to antagonise the influence and authority of the older *Edinburgh Review*. Its first editor was William Gifford (1809 to 1824), who was followed for a few months by (Sir) John Taylor Coleridge, pending the appointment of John Gibson Lockhart (1825-53). Later editors comprised Sir William Smith, the lexicographer, and the brothers R. E. and G. W. Prothero. The dress of the *Quarterly* is a sober drab, in contrast to the buff and yellow of its rival.

Quartermaster, a regimental officer on the staff of a dépôt, cavalry regiment, or infantry battalion, whose duties are to superintend stores, issue clothing, food, forage, fuel and other supplies, to allot barracks and tents, or mark out the camp. He has the relative rank of lieutenant. The QUARTERMASTER-GENERAL is the headquarters

staff officer (major-general or colonel) in chief control of all matters of supply, transport, marches, quarters, and the like. In the Navy the quarter-master is a petty officer who has charge of the steering of the ship (that is, he sees that the helmsman keeps her to her course and carries out the orders of the officer on the watch), the taking of soundings, heaving of the log, running of the lights, colours and signals and supervising of the compasses; while in port he looks out for arrivals and departures and generally keeps an eye on the execution of the work in detail.

Quarter-staff, a weapon employed in an early English pastime. It consisted of a pole $6\frac{1}{2}$ feet long shod with iron at each end. It was usually wielded by one hand holding it at the middle while the other grasped it between the centre and the extremity (hence possibly its name). To employ it proficiently, however, the player had to be nimble on his legs and be able to spin the staff around in his fingers while making dexterous play with it on the skull of his adversary. It was a weapon to strike, not to push with.

Quartz, the anhydrous mineral form of silica or silicon-dioxide (SiO_2) crystallising in the Hexagonal system. The word is sometimes extended to all forms of silica, including the non-crystalline chalcedony and jasper and even the hydrous opal. The crystalline variety is 7 in the scale of hardness and has a specific gravity of 2.6. Its most common crystalline form is the hexagonal prism terminated by six-sided pyramids. When colourless and transparent, it is known as rock-crystal, Brazilian pebble, Irish diamond, etc.; when violet, as Scottish methyst; when smoky, as Cairngorm. It also occurs rose-coloured; or milky, from the numerous cavities containing salt-water or liquid carbon-dioxide. All crystalline varieties break with a conchoidal fracture. It is one of the most abundant minerals, being an essential constituent of granite, eurite, felsite, liparite, gneiss, and mica-schist and forming almost the whole of quartzite, sand and sandstone.

Quartzite, a very hard, compact, granular rock, seldom schistose, but occasionally fossiliferous, which occurs among the older sedimentary rocks and is, in most cases, obviously an altered sandstone. It differs from the harder sandstones such as sarsen-stone only in showing when under the microscope signs of the partial fusion of some of its constituent quartz-grains. In some cases there is evidence of induration having resulted from the transfusion of heated silicated water rather than from dry heat or pressure.

Quassia, a bitter febrifuge wood originally obtained from *Quassia amara*, a lofty tree of Surinam belonging to the order Simarubaceæ, closely allied to the rue tribe. It is now mainly obtained from the allied *Picræna excelsa*, or bitter ash, of Jamaica. It is carved into "bitter cups" which give a taste to water and is said to be used as a hop-substitute in brewing, though its effects in this respect may be deleterious. Upon the lower

animals it has a narcotic effect and a decoction of the leaves is employed as an insecticide.

Quaternary Period, the name applied to the Pleistocene by those who consider that the appearance of man is sufficient to distinguish the more modern rocks as one of the primary divisions of the stratigraphical series. Others treat it merely as a continuation of Tertiary time and its alternative name therefore, is Post-Tertiary.

Quaternions were invented by Sir William Rowan Hamilton (1805-65) as a mathematical method of dealing with directions in space without the use of the arbitrary axes of Cartesian geometry. A quaternion itself is the factor or operator which changes one directed line (or vector) into another. Quantities which do not include direction are known as scalar and any vector can be regarded as the product of unit vector (which gives the direction) and a scalar quantity. If a vector be rotated into a new direction, the operator is known as a versor and therefore this versor must imply the existence of an axis and a definite angle. Suppose a vector, β , in the plane of the paper be rotated into a direction at right angles, also in the plane of the paper; the axis of the versor must be perpendicular to the plane of the paper and if i be this versor, $i\beta$ is the new vector. If this new vector be called j , we have the equation $i\beta = j$. We can again turn the vector through a right angle also in the plane of the paper and have $i^2\beta = ij = -\beta$, since the new vector is in the opposite direction to the original. This gives us

$$i^2 = -1, \text{ or } i = \sqrt{-1}.$$

It was by endeavouring to give a real geometrical meaning to the algebraical symbol $\sqrt{-1}$ that Sir William Hamilton was led to his calculus of quaternions. Eventually he was led to the adoption of three units in space, which he called i , j , and k and which fulfilled the following conditions:

$$\begin{aligned} i^2 &= j^2 = k^2 = -1 \\ ij &= -ji = k \\ jk &= -kj = i \\ ki &= -ik = j \end{aligned}$$

Working from these assumptions, he was enabled greatly to simplify the calculations and expressions of space geometry and his calculus has found unlimited application in the domain of theoretical physics.

Quatre-Bras, a village in Belgium, 10 miles S.E. of Waterloo, at the point where the roads from Brussels to Charleroi and Nivelles to Namur intersect—from which circumstance it derives its name ("Four Arms"). Here, on June 16, 1815, the allied forces under the Duke of Brunswick (who fell at the head of his Black Brunswickers), the Prince of Orange, and Sir Thomas Picton met the French under Ney in an obstinate conflict.

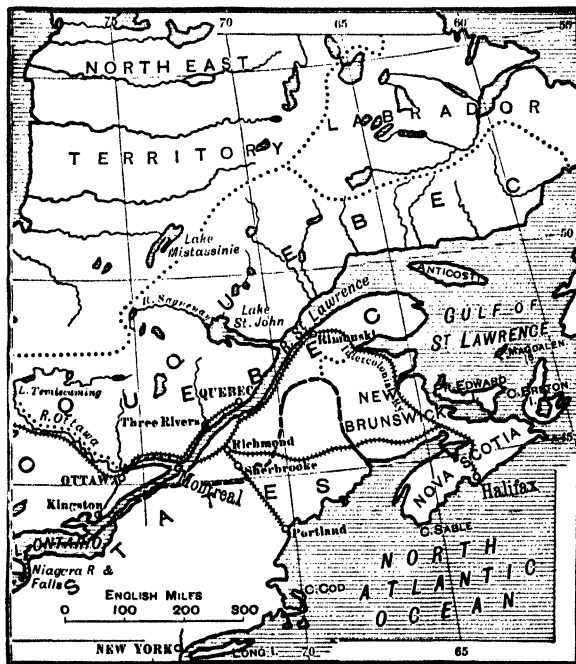
Quatrefages de Bréau, JEAN LOUIS ARMAND DE, naturalist, was born at Berthezène, near Vallerange, department of Gard, France, on February 10th, 1810, and studied mathematics and

medicine at Tournon and Strasburg. Settling at Toulouse to practise as a doctor, he was gradually attracted to natural history, to which, from 1840, when he went to Paris, he devoted the rest of his life. He made a special study of the Annelids and Molluscs and, in 1844, visited Sicily to prosecute his researches and afterwards the Bay of Biscay, where he closely observed the manners and features of the Basques. In 1850 he was appointed Professor of Natural History in the Lycée Napoléon and in 1855 to the chair of Anthropology. The conduct of the Prussians in the Franco-German War was his bitterest experience. "The Prussians," he said, "are not German; they are prussian." As an anthropologist, he ranged himself with those who maintained the unity of the human race. He died in Paris on January 12th, 1892. Among his works were *Métamorphoses de l'homme et des animaux* (1862), *Unité de l'esprit humaine* (1861), *Histoire naturelle des Annelés marins et d'eau douce*, *Annelides et Géphyriens* (1865), *Histoire de l'homme* (1867), *Ch. Darwin et ses précurseurs Français* (1870), *L'Espèce humaine* (1877), *Introduction à l'étude des races humaines* (1887-9), and *Théories transformistes: Romanes, Carl Vogt, Haeckel, Owen, etc.*

Quatremère, ÉTIENNE MARC, Orientalist, was born in Paris on July 12th, 1782, and studied Arabic under Silvestre de Sacy at the Collège de France. He was successively professor of Greek in the Academy of Rouen, of Hebrew at the Collège de France (1819) and of Persian at the School of Oriental Languages (1832). His chief work was *Recherches sur la Langue et la Littérature de l'Égypte* (1808); he also translated Makrizi's *Arabic History of the Mamelukes* (1837-45) and Rashid-ed-Din's *Persian History of the Mongols of Persia* (1836). He was the first to show the identity of the Copt and the ancient Egyptian and was thus the precursor of Champollion. He was gifted with an extraordinary memory but was of unsocial disposition. His criticism was as keen as his learning was vast. After his death in Paris, on September 18th, 1857, his library, Arabic MSS. and his notes were purchased by the King of Bavaria and are now in the Royal Library at Munich.

Quebec, a province of the Dominion of Canada, bounded on the N. by Ungava and Hudson Bay, on the E. by Newfoundland, Labrador and the Gulf of St. Lawrence, on the S. by the Bay of Chaleur, New Brunswick and the United States, and on the W. by Ontario, from which it is partly separated by the Ottawa. Its northern boundary largely consists of the East Main, flowing to James Bay, and the Hamilton, flowing to the Atlantic. It occupies an area of 351,873 square miles, of which 10,117 square miles are water, exclusive of the St.

Lawrence. The principal mountains are the Notre Dame or Green Range, running on the southern side of the St. Lawrence from near Levis to Gaspé Point, and reaching in Mount Sutton a height of nearly 4,000 feet; the Laurentian Range on the north of the St. Lawrence, of which the highest points are Cape Tourmente (1,900 feet), the Eboulements (2,547) and Trembling Mountain near Montreal (2,400). The great central plain covers an area of 10,000 square miles, but nowhere exceeds 300 feet in elevation. The chief rivers are the St. Lawrence and its many affluents, the Ottawa, East Main, Hamilton and Rupert. Nearly all the lakes are to the north of the St. Lawrence and include Mistassini, Ashwanipi, St. John, Fox, Temiscouata, Temiscamingue and Abbitibi. The minerals comprise copper, iron, gold, asbestos, mica, graphite and apatite. The climate is very cold in winter and very hot in summer, but bracing and healthy. The manufactures are mostly concerned with the lumber and leather trades, iron-founding, flour and grist mills and, in a minor degree, with textiles. The fisheries are of importance, but the wealth of



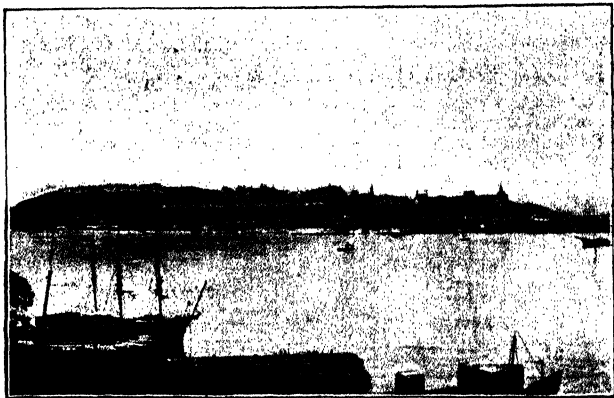
SKETCH MAP OF QUEBEC.

the province consists in its agriculture. In the valleys the soil is extremely fertile, yielding good crops of wheat, oats, barley, rye, maize, potatoes, hay, roots and fruit; there is excellent pasture also, and the mountains are covered with valuable forests of pine, ash, elm, hickory and walnut. Live-stock are raised in great numbers and the

creameries and cheese factories turn out an enormous quantity of dairy produce. Quebec (68,840) is the capital, but Montreal (267,730) is the largest city, other towns of importance being Three Rivers, Levis, St. Hyacinthe, Sorel, St. Johns, Hull, St. Henri and St. Jean Baptiste. Quebec was colonised by France in 1608 and taken by the British in 1759-60, the French Catholics (who form the bulk of the population) being guaranteed the enjoyment of their laws and religion by the Quebec Act of 1774. In 1791 Canada was divided into Upper and Lower Canada, but in 1841 the provinces were reunited. In 1867 they were separated once more under the names of Ontario and Quebec. The province returns 65 members to the Dominion House of Commons and 24 to the Senate, and is itself administered by a Legislative Council and a Legislative Assembly with a responsible ministry. Pop. (1901), 1,648,898.

Quebec, the capital of the province of the same name and formerly of all Canada, magnificently situated on the left bank of the St. Lawrence, at the mouth of the St. Charles, 400 miles from the sea and 180 miles below Montreal. The docks accommodate the largest vessels and extend to the opposite shore of the river at Levis. Among the public buildings are the Citadel crowning the summit of Cape Diamond, the Parliament and Departmental Buildings—a noble structure, quadrangular in plan, with towers at the angles—the City Hall, the Basilica or Roman Catholic Cathedral, the Hôtel-Dieu Convent and Hospital, the Governor's House, with monuments to Wolfe and Montcalm, the Anglican Cathedral, Laval University, the Seminary of Quebec, the Ursuline Convent, besides several other educational, literary, scientific and charitable institutions. The supply of water from Lake Charles is excellent. Railways communicate with all parts of the Dominion and the United States and steamers ply to Europe and the American ports. The timber trade is the chief source of wealth, but a large share of the general imports and exports passes through Quebec, which possesses, too, some local industries, such as iron-founding, the making of cutlery and nails, leather-dressing, and cotton and indiarubber manufactures. When Jacques Cartier sailed up the St. Lawrence in 1535 this site was occupied by an Indian fishing station. Champlain, the French explorer, founded the city in 1608 and gave it its name. Captured by the English in 1629, it was restored in 1632, with Canada, to the French, who made it the capital of the colony in 1663. After two attempts (1690 and 1711) to seize it, the English under Wolfe captured it in 1759 and have retained it, despite the American night assault (December 31st, 1775), when their leader, General Montgomery, perished. Pop. (1901), 68,840.

Quebracho, the name applied to various hard woods containing tannin which are used for tanning and dyeing in South America. The white species (*Quebracho blanco*), containing 14 to 16 per cent., is *Aspidosperma Quebracho* and is largely exported to France. The red kind (*Quebracho rubio*, *Loxopterygium Lorentzii*), from the River Plate, is too hard for easy use, but is important as a tanning



QUEBEC.

(Photo: J. E. Livernois, Quebec.)

material, in consequence of its rapid action. *Quebracho floja* is *Iodina rhombifolia*, and *Quebracho tipa* is *Macharium fertile*.

Quedlinburg, a town of Prussian Saxony, on the Bode, a tributary of the Saale, 31 miles S.W. of Magdeburg. In the crypt of the abbey-church, dating from the 10th century, lie the remains of the founder, Henry the Fowler. The Town Hall and gymnasium are also venerable buildings. Quedlinburg is the centre of a great gardening district, whence seeds of all kinds are exported to every part of the world. It has manufactures of starch, cloth, chemical dyes and iron. It was the birthplace of Friedrich Gottlieb Klopstock (1724-1803), the poet, and of Karl Ritter (1779-1859), the geographer. Pop. (1900), 23,378.

Queen, a word common to several Teutonic languages in the sense of "woman" or "wife" (Gothic *gens* and *gino*, Anglo-Saxon *cwen*, Icelandic *kvan* and *kona*; cf. Greek *gunē*). *Queen* is merely another form of the same word. In Anglo-Saxon "queen" came to be used of the king's wife only. In Wessex, however, *hlæfðige* ("lady") was the more usual term. "Queen" is the word employed in speaking of Matilda, wife of William I., and other royal consorts of the Norman and Plantagenet dynasties; but it is never applied to the Empress Matilda, who claimed the crown in her own right. It is now used alike of the queen-consort, the queen-dowager (the widow of the king) and the queen-regnant. Owing to the doubts which still

lingered as to whether a woman could reign in England, it was found necessary on the accession of Mary Tudor to pass a statute declaring that the queen-regnant has the same powers and prerogatives as a king. By the Act 25 Edward III. it was made treason to compass or imagine the death of the queen-consort or to violate her person; and, if the queen gave her consent to the latter, she herself committed treason. The legal position of a queen-consort is that of a *femme sole* and not of a *femme covert*, so that she may purchase and convey lands or sue or be sued apart from her husband.

Queen Anne's Bounty was established in 1704 for the purpose of aiding the poorer clergy. The fund was derived from the proceeds of the tax called annates or first-fruits (consisting of the first year's income of every living) and also that which exacted the tenth portion of the income in subsequent years. These taxes, originally levied by the Pope, had been appropriated by Henry VIII. at the Reformation. These revenues were earmarked by Parliament, with the consent of Queen Anne, as a perpetual augmentation fund for poor livings in the Church of England and their administration was placed in the hands of a corporation comprising various ecclesiastical, legal and other dignitaries. The capital fund now amounts to about £7,000,000.

Queenborough, a town on the west coast of the Island of Sheppey ("Sheep Isle"), divided by the Swale from the mainland, North Kent, England, 2 miles S. of Sheerness. The chief buildings are Holy Trinity Church and the Guildhall. The manufactures include chemical manures and glue, and here was started the first copperas factory in England. The oyster fisheries, once valuable, have declined in face of the increased attention paid to those at Whitstable, 14 miles farther east. The town is the principal port of embarkation for Flushing in Holland, the to-and-fro traffic being of growing importance. The town was founded by Edward III., who called it after his Queen Philippa, though not in name. The castle built for the King by William of Wykeham was almost wholly demolished in the time of the Commonwealth. Pop. (1901), 1,544.

Queen Charlotte Islands, a group in the Pacific Ocean, off the coast of British Columbia, Canada, to which the isles belong. They comprise Graham, Moresby—the two largest—and others. Coal, copper, iron and gold-bearing quartz occur. The islands are well wooded and their shores contain several fine natural harbours. The fisheries, especially of halibut, are extremely productive. The Haida (or Hydah) Indians possessed in a higher degree than any other race of the west coast what might be called an æsthetic sense, as the carving of their totem-posts testified, but the art was allowed to fall into disuse. Besides having the reputation of being the most intelligent, they were also generally regarded as the handsomest of the North-Western American Indians, in spite of their apparently deliberate attempts to make themselves hideous, by the use, for example, of ornaments

which were thrust through their lower lip to make it protrude in an ungainly fashion, though they may have deemed this a mark of enhanced beauty. The Hydahs seem to be retrograding and declining in numbers, which may now be estimated at about 700.

Queensberry, WILLIAM DOUGLAS, 4TH DUKE OF, known contemptuously as "Old Q.," was born in 1724. From his school days to old age he was notoriously addicted to the vicious tastes of the fast life of his time. He was a great gambler and, unhappily for Charles James Fox, was one of his mentors. He became 3rd Earl of March when he reached his majority and succeeded to the earldom of Rugby in 1748, on the death of his mother, countess in her own right. He succeeded to the dukedom in 1778, and in 1786 was created a British peer by the title of Baron Douglas of Amesbury. Whenever he did anything meritorious—as in his profuse patronage of the opera—the gratification of mean and selfish pleasures was the moving spirit. He maintained his character to the last. He died in London on December 23rd, 1810, and was buried beneath the communion-table of St. James's, Piccadilly. Both Robert Burns and William Wordsworth poured their scorn upon the ignoble peer, the latter in a sonnet beginning "Degenerate Douglas," which was inspired by the duke's wanton destruction of the woods at Drumlanrig and Neidpath Castle, near Peebles.

Queen's College, an institution in Harley Street, London, for the higher education of women, founded in 1841 and incorporated by royal charter in 1853. After a preparatory course at a school for pupils under 14 the students remain at college three years if they seek the grade of associate, and six years or longer if they aim at becoming fellows. F. D. Maurice, Charles Kingsley and many other enlightened men took an active part in promoting its fortunes.

Queen's County, an inland county of the province of Leinster, Ireland, having King's County to the N. and W., Kildare and Carlow to the E., Kilkenny to the S., and Tipperary to the S.W. Its area of 663 square miles is mainly level, but the Slieve Bloom Range in the north-west reaches a height of 1,733 feet and in the east rise the Dysert Hills. The chief rivers are the Nore and Barrow. The principal crops are oats, barley, potatoes and turnips. Sheep and cattle are raised in large numbers. Coal and iron-stone, part of the Kilkenny field, have been worked; limestone, sandstone, slate and marble are quarried, and much peat is cut. Remains of the gigantic Irish elk have been found in the bogs. Woollens and cotton are the leading manufactures. The county contains some examples of round towers and other antiquarian relics, while on the Rock of Dunamase stand the ruins of the castle built by Dermot McMurrough, King of Leinster, which Cromwell destroyed. The county and its capital, Maryborough, were named after Queen Mary, the spouse of William III. Pop. (1901), 57,226.

Queensferry, SOUTH, a small seaport, Linlithgowshire, Scotland, on the southern shore of the Firth of Forth, 9 miles W.N.W. of Edinburgh. It was named in honour of St. Margaret, Queen of Malcolm Canmore, who used the ferry—which continued in use for several centuries to avoid the long *détour* by Stirling, or the wider crossing towards the mouth of the Firth—on her way to the Royal Palace at Dunfermline. Port Edgar, half a mile to the west, was so called because Edgar Atheling had landed there. Dalmeny House, the seat of the Earl of Rosebery, and Hopetoun House, the seat of the Marquis of Linlithgow, are in the vicinity. The chief buildings are the old Town Hall and the Countess of Rosebery Memorial Hall. The Hawes Inn, mentioned in *The Antiquary*, is still carried on. The town is largely resorted to by tourists as the most advantageous point for inspecting the Forth Bridge, which is best seen from the water-level. Pop. (1901), 1,850. On the opposite shore is the summer resort of NORTH QUEENSFERRY, 2 miles S. of Inverkeithing. It is in close proximity to St. Margaret's Hope, the great anchorage ground which has been proposed for the site of the Scottish East Coast naval base. Pop. (1901), 594.

Queensland, a state of the Commonwealth of Australia, occupying the whole of the north-eastern portion of the continent, bounded on the N. by Torres Strait, on the E. by the Great Barrier Coral Reef and the Pacific, on the S. by New South Wales, on the S.W. by South Australia, on the W. by the Northern Territory of South Australia and on the N.W. by the Gulf of Carpentaria. It covers an area of 668,497 square miles, has a coast-line of 2,500 miles, is 1,250 miles long and 950 miles wide at its widest part and includes Wellesley Islands and islands in Torres Strait and off the eastern seaboard. It grew out of the penal settlement at Moreton Bay, and received independence in 1859. In 1901 it became part of the Australian Commonwealth and is administered by a Parliament of two Houses—the Legislative Council and the Legislative Assembly—an Executive Ministerial Council and a Governor. The Pacific coast possesses many good harbours, e.g., Brisbane in Moreton Bay, Maryborough in Wide Bay, Gladstone on Port Curtis, Rockhampton in Keppel Bay and Cardwell in Rockingham Bay. Most of these are protected by the Great Barrier Reef. The only good port on the other side is at Point Parker. Rivers are plentiful though not large. The Logan, Brisbane, Mary, Burnett, Fitzroy, Burdekin, Hubert and Endeavour fall into the Pacific and the Mitchell, Flinders, Leichhardt and Albert drain into the gulf. Mountain ranges run parallel with the eastern coast at a distance of from 30 to 70 miles inland. Other ranges are found in the interior. Bellenden Ker, to the north-west of Rockhampton Bay, is 5,200 feet high and Mount Dalrymple farther south reaches a height of 4,250 feet. The fauna includes alligators, the oxrhynchus, the dingo, the kangaroo, the flying fox, the emu, the cassowary, many birds of gorgeous plumage and the dugong (or sea-cow). The flora comprises many tropical trees and excellent timber is provided by the Kauri pine, red cedar

and other valuable trees. The climate, though hot, is healthy and bracing on the higher levels. Pastoral farming was, and still is, the chief industry, millions of sheep and cattle finding nourishment on the wide treeless table-lands. Of the mineral resources coal is the most important, the fields extending over 24,000 square miles. Great quantities are exported from the Newcastle, Ipswich and Bundaberg districts. Gold is found in many parts and silver, copper, tin, iron and the rarer minerals are abundant and only await labour for their exploitation. The pearl and trepang fisheries off the coast of York Peninsula yield profit, the Moreton Bay oysters are far-famed and the supply of



SKETCH MAP OF QUEENSLAND.

ordinary fish is excellent. The sugar cane, cultivated largely by Kanaka labour, coffee, rice, and other tropical products, besides wheat, barley, maize and potatoes, are extensively cultivated. Bananas, oranges, mangoes, strawberries and grapes are grown, while tobacco yields well. The industries are represented by engineering works, iron foundries, sugar mills, saw-mills, breweries, meat-preserving establishments, soaperies, tanneries, distilleries and cloth factories. As the tropical and temperate parts of the state differ widely in their economic and political conditions, there has been, at times, some agitation in the former for their separation. The capital is Brisbane (119,428). Pop. of state (1901), 503,286.

Queen's Metal, an alloy resembling Britannia metal, but containing lead in place of some of the

tin or antimony of that substance. It is hence cheaper, but inferior in quality and is very commonly used for the production of jugs, culinary articles, etc.

Queenstown, formerly COVE OF CORK, a seaport on the south shore of Great Island, Ireland, 14 miles S.E. of Cork. The town is picturesquely situated on the slope of a hill, the streets rising in terraces from near the water's edge and, owing to its salubrious climate, is a favourite health-resort. The Catholic Cathedral of the diocese of Cloyne, a graceful work, was designed by A. W. Pugin. In the cemetery of the old ruined church of Clonmel lie John Tobin (1770-1804), author of *The Honey-moon*, and Charles Wolfe (1791-1823), who wrote the immortal verses on "The Burial of Sir John Moore." Queenstown is the principal naval station in Ireland, and the port of call of the outward- and homeward-bound United States liners. The present name was given to it on the occasion of Queen Victoria's visit in 1849. An excellent harbour, with an area of eight square miles, is strongly defended by forts and batteries. Pop. (1901), 7,909.

Quercite, a compound of the composition $C_6H_{12}O_6$. In certain points it resembles the sugars which are usually found with it in the chief source of the compound, namely, acorns. Thus it has a sweet taste and is easily soluble. It has been shown to belong to the benzene series of compounds and to be represented by the formula $(C_6H_7(OH))_6$, being an addition compound of benzene.

Quercitron, the inner bark of a North American species of oak, *Quercus tinctoria*, the Black or Dyers' Oak, which is used as a yellow dye. The tree is common in the Eastern United States and Southern Canada and reaches a height of from 70 to 100 feet. Though the bark is externally dark, it is inwardly yellow and the tree is therefore sometimes known as the Yellow or Yellow-Bark Oak.

Queretaro, a state and city of Mexico, North America. The former has an area of 4,500 square miles, occupying a central plateau of the Cordilleras and being broken up by rugged mountains. The valleys are fertile, producing grain, maize, fruits and cotton and feeding large numbers of sheep and cattle. Gold, silver, antimony, mercury and other metals are worked, but not on a great scale, and the famous Mexican opals mostly come from the state. There are manufactures of textiles, pottery and iron ware. Pop. (1900), 232,389. The city stands high at a distance, in a direct line, of 110 miles south-west of Mexico. The Hercules cotton-mills are the largest in the republic, and the woollen, leather, soap and wood-carving industries also prosper. The Emperor Maximilian was executed here in 1867. The principal buildings are the Federal Palace, the Government Palace (both constructed of basalt), the Maximilian Chapel, the Municipal Palace and the Iturbide Theatre. Pop. (1900), 33,152.

Quern, a primitive hand-mill for grinding corn. It was usually formed of two flat circular stones,

the upper being attached to the lower by means of a pin of wood or metal on which it revolved. The upper stone contained two holes, one in the centre, into which the grain was dropped, and a smaller one near the rim to hold the stick used in turning it. Querns have been found in all parts of Europe which were inhabited by primitive peoples, including the lake-dwellings of Switzerland. They are still used in the Hebrides, the Shetlands and the less-frequented parts of Ireland.

Quesnay, FRANÇOIS, physician and economist, was born at Mérey, department of Seine-et-Oise, France, on June 4th, 1694. He studied medicine at Paris and settled as a practitioner at Mantes, where he speedily acquired a great reputation, becoming physician-in-ordinary to the King in 1744 and first consulting physician in 1752. It was in the field of economics, however, that he was destined to achieve fame. Besides important articles in the *Encyclopédie*, his doctrines were set forth in *Tableaux Économiques* (1758) and in other works, such as *Maximes Générales du Gouvernement Économique d'un Royaume Agricole*. He was the founder of the Physiocratic school, which maintained that a natural constitution exists in society—*droit naturel*—which conferred a fundamental right to freedom of person, of thought, of property and of exchange or contract. Land or raw materials were the sole source of wealth, leaving labour and capital out of account, and the doctrine of the mercantile system, namely, that wealth consists in the precious metals, was scouted. Since, therefore, wealth consisted in the produce of land, all revenue should be raised from a direct land tax. Freedom of trade and the doctrine of *laissez-faire* followed as a matter of course. Thus Quesnay was a free-trader before Adam Smith and a single-tax advocate before Henry George. He died in Paris on December 16th, 1774.

Quesnel, PASQUIER, Jansenist theologian, was born in Paris, the son of a bookseller of Scottish origin, in 1634 and was educated at the Sorbonne. He entered the Congregation of the Oratory and, five years later, was appointed director of the Paris house. His edition of the works of Pope Leo the Great was placed on the Index Expurgatorius for its Gallican tendencies, and in 1685, refusing to abandon Jansenism, he withdrew to Brussels, where he resided for twenty years, keeping up an active correspondence with the Reform party within the Church and becoming on the death of Arnauld (1694) the leader of the Jansenists. Imprisoned by the Archbishop of Mechlin (Malines) in the palace cells in 1703, his friends contrived his escape in a few months. He was then excommunicated, but, preferring freedom to the penalty of penitence in a monastery, he retired to Amsterdam, where he died in 1719. His celebrated *Réflexions Morales sur le Nouveau Testament* begun in Paris, was continued and published in Brussels, but condemned by the Bull *Unigenitus*. (September 8th, 1713).

Quételet, LAMBERT ADOLPHE JACQUES, astronomer and statistician, was born at Ghent, Belgium

on February 22nd, 1796, and educated in his native town. He became Professor of Mathematics in the Royal College of Ghent in 1819 and was appointed to the similar chair in the Brussels Athenæum in 1824. In 1828 the Government authorised him to superintend the erection of the Observatory at Brussels, of which he undertook the direction till his death. In 1836 he was transferred to the chair of Astronomy and Mathematics in the Royal Military School and in 1841 was appointed President of the Central Statistical Bureau of Belgium. His services to statistical science were invaluable, and he was eight times chosen President of the different European Congresses of Statisticians held during his life. In 1834 he had become perpetual secretary of the Belgian Académie Royale, to whose publications he made important contributions. In his works, the chief of which was *Sur l'Homme et le Développement de ses Facultés* (1835), he gave much attention to the doctrine of probabilities in its practical aspects. His last important work, *L'Anthropométrie*, appeared in 1871. He died at Brussels on February 17th, 1874.

Quetta, locally known as Shalkot, a district and town, Baluchistan, near the Afghan frontier, situated on a mountain-girt plateau 5,600 feet above the level of the sea. Fortifications have rendered it a place of strategic importance, commanding the advance from Kandahar and keeping open the Bolan Pass. It is also in communication with the railway system of India. Besides the residency founded in 1876 by Sir Robert Sandeman, the buildings include the Staff College, hospitals, schools and a club-house. It has become an emporium of trade with Afghanistan, Persia and Central Asia. Brewing, flour-milling and the manufacture of patent coal-fuel are carried on. Pop. estimated at about 30,000.

Quevedo Villegas, FRANCISCO GOMEZ DA, poet, novelist and statesman, was born at Madrid in September, 1580. He made a great name as a scholar at the university of Alcalá, but in 1611 was obliged to leave Spain in consequence of a duel. Under the Duke of Osuna, when Viceroy of Sicily and Naples, he showed much diplomatic and financial ability, but was involved in his fall in 1619. In 1623 he came to the court of Philip IV., whom he tried to dissuade from government by favouritism, attacking the system in his *Politica de Dios* (1626) and *Hell Reformed* (1628), but was at length overthrown by Olivares and imprisoned in a convent at Leon from 1639 till the fall of the minister four years later. His health was completely broken by this imprisonment and he only survived his liberation two years, dying at Villanueva de los Infantes on September 8th, 1645. Quevedo wrote much on various subjects, and was described by Cervantes as "the scourge of silly poets." His own verse was published without his consent; but he discovered and published the works of the poet Francisco de la Torre, which were for a time thought to have been his own. Among his prose writings *El Vida del Buscón Pablos* (1626), a novel, and five *Visions* (of which an English version appeared in 1667 by Sir R.

L'Estrange) should be mentioned. After his death his poems were published under the title of *Parnaso Español*, divided into sections prefaced by an invocation to each of the Muses.

Quiberon, a peninsula in the department of Morbihan, Brittany, France, about 20 miles S.E. of Lorient, on the northern shore of the Bay of Biscay. It is seven miles long and at its extremity is situated the town of Quiberon, a sea-bathing resort in growing vogue. The sardine fishery is of importance. The town, once called Locmaria, is of unknown origin, but the monoliths in its vicinity point to its being a place of vast antiquity. In the bay the British under Admiral Hawke defeated the French fleet in 1759, and on June 25th, 1795, a body of *émigrés*, who had landed under cover of British guns to join the Chouans (Royal insurgents), were routed with great slaughter by General Hoche. Pop. 3,000.

Quiché, one of the civilised nations of America, akin to the Mayas and constituting with them the Maya-Quiché family. The Quichés formed and still form the bulk of the population in Guatemala, where they are divided into several distinct groups, such as the Cakchiquels, Zutugils, Chorti, Ixils, Chanabuls, Chols, Aguatcatcs, all speaking dialects of the Quiché mother-tongue. This is one of the few American languages which possesses a literature. It includes the Rabinal Achi, a native drama, and the famous Popol-Vuh, containing the national histories, myths and traditions of which the text, with French translation, was published in Paris (1861) by the Abbé Brasseur de Bourbourg.

Quichuas, the chief civilised people of South America, who with the kindred Aymaras occupied the whole of the Andean plateaux from Cuzco to Lake Titicaca, i.e., most of the present states of Ecuador, Peru, Bolivia and Chile, south to the river Maule, on the Araucanian frontier. The Quichuas formed the bulk of the population of the empire of the Incas, under whom they arrived at a high degree of culture, as attested by their numerous temples and other monuments, their great highways, irrigation works and cultivated lands, carried high up the slopes of the Cordilleras by means of banked-up terraces. They were skilled especially in the arts of weaving, dyeing and pottery, and were able to record events by the so-called quippos. (The quippo, or quipu, was a cord about two feet long, spun from threads of different colours, and bearing attached to it a number of smaller variegated and knotted threads in the form of a fringe. The colours were not arbitrarily selected, but conveyed definite meanings; as white for silver and yellow for gold, or, in another aspect, white for peace and red for war. These quippos were chiefly used as a register of births, marriages and deaths, of the number of the people and of important facts and events.) They embalmed the dead and deposited with them the objects which the departed most valued in life. Multitudes of these objects have been found in the graves at Ancon, near Lima and elsewhere, throwing a flood of light on the social system, arts, industries and general culture of the Quichua people. The

Quichua (properly Inca) language was highly cultivated and many of the national songs, dramas and legends, handed down orally, have since been published. The language is highly polysynthetic.

Quick-firing Gun, usually abbreviated into Q.F. ("quick-firing"), a gun which is furnished with a metal case known as a quick-loader. It is attached to the rifle near the breech and has a spring which pushes up the cartridges in rapid succession.

Quicklime consists of the oxide of calcium, CaO. It is prepared by exposing chalk, limestone, or other natural calcium carbonate to intense heat, when carbonic acid, water and any organic matter in the carbonate are driven off. It forms a white mass which is very infusible and if heated strongly glows with a bright white light. It is hence used largely for forming the lime cylinders for limelight and for making the furnaces for fusing platinum. It unites with water with great avidity, much heat being evolved by the combination, which results in the formation of slaked lime, $\text{CaO} \cdot \text{H}_2\text{O}$. Lime is extensively employed in making mortar and cement and also for a very great number of technical and ordinary purposes.

Quicksilver. [MERCURY.]

Quietism, a form of Mysticism, which consists in suppressing all intellectual activity and, indeed, all consciousness of self and the external world, so that the soul becomes absorbed in the contemplation of the Divine Being. Quietism closely resembles other forms of Mysticism, but the Quietists attached even less importance to the practical virtues than is usual with Mystics generally. The founder of this religious school was the Spanish theologian Miguel de Molinos (circa 1627-97), whose *Guia Spirituale* was published in 1675. From Spain Quietism passed to France, where its chief exponents were Madame de Guyon (1648-1717) and the saintly Archbishop Fénelon (1651-1715). The "Confessions of a Beautiful Soul," in Goethe's *Wilhelm Meister*, are a well-known illustration of it, and it may be considered as allied to a part of the Buddhist religion.

Quillimane, or KELIMANE, a port of Portuguese East Africa, situated in 18° S., on the left bank of the river of the same name, supposed to have been a branch (now silted up) of the Zambezi. The town is laid out about ten miles from the river's mouth. Indiarubber is grown in the district and export and import trade are carried on. Pop., about 8,000.

Quill, a term applied (1) to the hollow cylinder at the base of the shaft of a feather and (2) to any of the larger wing feathers. Those of the goose, turkey and swan were formerly the only material of writing-pens in the West, though the manufacture of quill pens has lost its importance since the introduction of steel pens. Pens made from crow quills are still used for drawing and the name is given to a fine steel pen. The thickened hairs or spines of the porcupine are also known as quills, as in *Hamlet*, "like quills upon the fretful porpentine."

Quiller-Couch, ARTHUR THOMAS, novelist, poet and critic, was born at Bodmin, in Cornwall, on November 21st, 1863. He is a grandson of Jonathan Couch of Polperro (1789-1870), the eminent naturalist. He was educated at Newton Abbot, Clifton College and Trinity College, Oxford, where he was lecturer in classics, 1886-7. He has always taken an active interest in the affairs of his native shire and is a magistrate and county alderman. The success of his first novel, *Dead Man's Rock* (1887), a brilliant adventure in the field of sensation, induced him to devote himself to literature. *Troy Town* (1888) proved him further to be richly endowed with humour.



A. T. QUILLER-COUCH.

(Photo: Heath, Plymouth.)

Among his other novels were *The Splendid Spur* (1889), *The Blue Pavilions* (1891), the second serial ever published in *The Daily Chronicle*, *I Saw Three Ships* (1892), *The Ship of Stars* (1899), *The Laird's Luck* (1901), *The White Wolf* (1902), *The Adventures of Harry Revel* (1903), *Hetty Wesley* (1903), *Fort Amity* (1904), *The Mayor of Troy*, *Sir John Constantine* (1906) and *Poison Island* (1907). He is also a master of the art of the short story, many of his works in this mode having appeared in book form, such as *Nights and Crosses* (1891), *The Delictable Duchy* (1893), *Wandering Heath* (1895), and *Old Fires and Profitable Ghosts* (1900). The many critical *causeries* which he contributed to *The Speaker* were a special feature of the paper and a selection of them was published in 1896, under the title of *Adventures in Criticism*. As a poet he wrote *Green Bays and Verses and Parodies* (1893), and his fine taste and judgment were seen in *The Oxford Book of English Verse* (1900), and other anthologies. In 1897 he was commissioned to complete the story of *St. Ives* which R. L. Stevenson had not lived to finish and this was not so much

a compliment as a tribute to his unerring craftsmanship, as well as a recognition of the fact that probably he alone of contemporary novelists could successfully undertake so delicate a work. It may be said that "Q," or "A. T. Q.-C.," without making any parade of it, after the fashion of the self-conscious school, is a perfect master of style.

Quimper, or QUIMPER-CORENTIN, a town of the department of Finistère, Brittany, France, on the Odet, at the head of an arm of the Bay of Biscay, 35 miles S.E. of Brest. The public buildings include the beautiful cathedral of St. Corentin (begun in 1239 and practically completed in 1515), the axis of the choir in which was deflected to symbolise the bowed head of the dying Saviour, the 11th-century church of Locmaria, the Town Hall, the Musée (with galleries of ethnography, antiquities and pictures), the Lycée, public library and many religious, educational and charitable institutions. The manufactures include pottery—the enamelled faïence dates from 1650—paper, leather, besides iron-founding, brewing and fisheries, especially the sardine. Pop. (1901), 19,440.

Quin, JAMES, actor, came of an Irish family and was born in London on February 24th, 1693. He was educated at Dublin, where he took to the stage. In 1716 he made his reputation at Drury Lane in the part of Bajazet in *Tamerlane*. Having played for several years at Rich's Theatre, Lincoln's Inn Fields, and been temporarily under a cloud on account of having killed another actor in a duel, he returned to Drury Lane in 1734. Here he acted—with intervals of change, during some of which he performed in Ireland—till 1751, after which he lived in retirement at Bath, where he died on January 21st, 1766. He was a man of considerable natural gifts and had an extremely varied repertory. He was eclipsed in his later years by Garrick, with whom he appeared, together with Mrs. Cibber, in 1746, in the *Fair Penitent*. Quin was an intimate friend of James Thomson, the poet.

Quince (*Cydonia vulgaris*), a tree belonging to the sub-order Pomaceæ, of the rose tribe, with leafy calyx-lobes and more than the two seeds in each division of the core which are characteristic of Pyrus, the genus to which the apple, pear and mountain ash belong. It is a native of the Mediterranean region, is usually dwarfed but sometimes reaches a height of 15 or 20 feet, flowers in May or June and bears a large golden-yellow fruit of variable form, fragrant odour, but, when raw, of austere flavour. It is cooked with apples and was the original ingredient of marmalade, *marmelo* being the Portuguese name of the fruit. The quince is used as a stock on which to graft pears. The fruit was known to the ancients and it has been conjectured that the golden apples of the Hesperides, which figure in several mythological stories, were quinces.

Quincy, capital of Adams county, Illinois, United States, standing on a high bluff of the east bank of the Mississippi, 104 miles W. of Springfield. Government House, the city hall and the courthouse are the principal public buildings and there are several parks. Having a good river harbour

and being an important railway centre, the town is exceedingly prosperous. It contains iron-works, flour- and paper-mills, and factories for making agricultural implements, carriages and sewing-machines, besides meat-packing establishments. Pop. (1900), 36,252.

Quincy, a town of Norfolk county, Massachusetts, United States, 8 miles S.E. of Boston. It was the birthplace of John Hancock, one of the statesmen of the Independence period, John Adams, the second President of the Union and his son John Quincy Adams. Its granite is famous, being used throughout the States. The material required for the construction of the Bunker Hill Monument (1826-7) was conveyed from the quarries, a distance of three miles, on the first railway in the United States, horse-power being employed. The manufactures include boots and shoes, iron and brass ware, soap, oils and chemicals. Adams Academy, the Woodward Institute, and the Thomas Crane Library are the principal buildings. Pop. (1900), 23,899.

Quincy, JOSIAH, statesman of the American Revolutionary epoch, was born at Boston, Massachusetts, on February 23rd, 1744, and educated at Harvard. He studied law and soon reached an eminent position. The growing difficulties between the Mother Country and the Colonies excited his closest attention and he wrote several stirring pamphlets. He was among the earliest to recognise that war was inevitable with separation as its consequence. He was cognisant of the flinging of the tea-chests into Boston Harbour and wrote, in May, 1774, his most important work, *Observations on the Act of Parliament commonly called the Boston Port Bill, with Thoughts on Civil Society and Standing Armies*. Later in the year he sailed to England in the hope that the voyage might avert consumption, but the disease had already made fatal inroads and he died, on the homeward journey, off Gloucester, Massachusetts, on April 26th, 1775.

Quincy, JOSIAH, statesman, son of the preceding, was born at Boston, Massachusetts, on February 4th, 1772, and educated at Andover and Harvard. He was called to the bar in 1793, but his comparatively small practice left him ample leisure for politics. He was elected to Congress in 1804 and became one of the chief orators of the Federal party. He denounced slavery and opposed the admission of the western states into the Union. After 1812 he retired from Congress, but took part in the affairs of Massachusetts and was for five years mayor of Boston. He was also president of Harvard University from 1829 to 1845 and wrote a history of the university and of Boston, as well as lives of his father and John Quincy Adams. He died at Quincy, Massachusetts, on July 1st, 1864.

Quinet, EDGAR, philosopher, poet and historian, was born at Bourg, in the department of Ain, France, on February 17th, 1803. He was educated at Charolles, Bourg, the Lycée of Lyons and, with the reluctant consent of his father, studied law in Paris. His first book, *Les Tablettes du Juif Errant*, was published when he was only 17. Two years later he

translated Herder's *Philosophy of History*. He travelled in Germany, Italy and England in his early years, and also produced his poems *Napoléon* (1836) and *Prométhée* (1838). In the latter year appeared his *Examen de la Vie de Jésus*, in which he pointed out the shortcomings of Strauss. His own religious feeling was revealed in his Lyons lectures, which were published under the title of *Le Génie des Religions*, in 1842, and in his attacks on the Jesuits. His lectures at the Collège de France so excited the public mind that they were prohibited by Government in 1846. Quinet took part in the revolution of '48 and represented Ain in the Assembly, but after the *coup d'état* had to live in Belgium and Switzerland. Returning to Paris in 1870, he sat in the National Assemblies at Bordeaux and Versailles and signalled himself by his patriotic speeches. Besides the books mentioned, he wrote *Histoire de mes Idées* (1860) and several historical and imaginative works. He was the lifelong friend of Jules Michelet and died in Paris on March 27th, 1875.

Quinine, one of the most important of the group of compounds known as the alkaloids. It occurs largely together with an allied alkaloid known as cinchonine in cinchona bark. It is found in the greatest quantity—2 or 3 per cent.—in the variety known as yellow bark, *Cinchona calisaya*, and may be extracted by suitable solvents. The exact methods of extraction and the details of the process by which the compounds are commercially obtained are kept to some extent as trade secrets. Quinine in its chemical deportment behaves as a basic substance, uniting with acids to form salts. Of these, sulphate of quinine is that which is commonly used and the form in which quinine is almost universally employed. The alkalioid itself has the composition $C_{20}H_{24}N_2O_2$ and crystallises in needle-shaped crystals slightly soluble in cold water and more easily in hot. It dissolves readily in dilute sulphuric acid and the solution is distinguished by being fluorescent, having a fine blue fluorescent tint. Quinine can be readily detected by the beautiful green coloration produced when chlorine water, followed by ammonia, is added to the compound or its solution. Its chemical constitution is not yet satisfactorily determined, but it appears to be a quinoline derivative. The sulphate of quinine is frequently given in one-grain doses as a tonic and in larger doses in fevers or malaria. Quinine is often administered in the form of the compound citrate of iron and quinine, the dose of the drug being from five to ten grains for an adult. The Pharmacopœia contains, moreover, a pill, tincture, ammoniated tincture and wine of quinine, besides several preparations of bark, of which the best known is the *Tinctura Cinchonæ Composita*. Quinine is a valuable tonic; it reduces the temperature of the body and is a direct specific for the treatment of ague. Its prophylactic properties in influenza epidemics have been repeatedly demonstrated. It is liable when

administered in large doses to produce headache, deafness, singing in the ears and other symptoms; to this condition the term "Cinchonism" is applied.

Quinol. [HYDROQUINONE.]

Quinoline, an organic compound of the composition C_9H_7N . It occurs in coal-tar and bone-oil and may be prepared by numerous reactions. It appears to consist chemically of a benzene and pyridine ring united together by two common carbon atoms. It is a colourless liquid and possesses a powerful and penetrating odour. It has a specific gravity of 1.095 and boils about 239°F. In its chemical behaviour it acts as a basic substance, uniting with acids to form compounds analogous to salts. It forms a large series of derivatives, formed by the replacement of some of the hydrogen by other elements. As this substitution can take place in either the benzene or the pyridine ring there is a very great number of isomeric forms. It has of late years derived very much additional interest from the fact that many of the alkaloids and other compounds possessing tonic properties appear to be derivatives of quinoline or of an isomeric substance termed iso-quinoline.

Quinone. The term quinone is a general one applied to all benzene derivatives in which two oxygen atoms take the place of two atoms of hydrogen. According to the relative position, different classes of quinones exist. When no prefix is added, however, quinone generally means Benzoquinone, a compound of composition $C_6H_4O_2$, which is obtained by the action of oxidising agents upon aniline and other benzene compounds. It forms crystals of golden-yellow colour, which melt at 116°F, has a peculiar odour and is easily soluble in all ordinary solvents. By reduction it yields the compound hydroquinone, which is largely employed as a developer in photography.

Quinquagesima (Latin, "fiftieth"), Shrove Sunday, the Sunday immediately preceding Ash Wednesday and, therefore, the last Sunday before Lent. Though literally the fiftieth day before the octave of Easter—namely, Low Sunday, or the Sunday following Easter Day—it has been plausibly suggested that this name as well as Sexagesima and Septuagesima, was adopted without reference to the precise number, but to carry out the analogy, misleading of course, with Quadragesima, the Latin term for Lent.

Quinsy (reduced from the earlier form "Squincy," a contraction of "Squinancy"; Greek, *Kyanche*), inflammatory sore throat. [TONSILLITIS.]

Quintain, an old English pastime, dating from the 14th century and probably earlier. The usual form consisted of a stout vertical wooden post, on the top of which was a strong horizontal bar of wood which could rotate rapidly on a well-greased pivot. To one end of this bar was securely fastened a sack of sand and to the other end a broad board. The apparatus, so prepared, was now ready for the

competitor, whose object was to ride a-tilt at the board with a lance or pole and pass forward before the sack swung round and struck him in the back. If he were not adroit he might not only be hit, but actually swept off his horse. The competitor who struck the board and escaped the sack the greatest number of times in so many tries won the prize. It was necessary to adjust the sack and board to the level of a man seated on horseback. In this form of the competition, a horse being necessary, the pastime was almost reserved to yeomen. But the quintain could also be adapted for the use of foot competitors, who ran at the board from a given mark with a pole and tried to clear the sack. It was a foul to deviate from the straight line. Tilting at the ring was a more intricate modification, a ring taking the place of the board and the aim of the rider being to hook it with the point of his lance. If he failed (as he commonly did) he stood a good chance of being unseated.

Quintana, a street in the Roman camp which intersected the tents of the two legions in such a way as to divide the fifth maniple, or company, from the sixth and the fifth turma, or troop, of horse from the sixth. It was the market and business-place of the camp.

Quintana, MANUEL JOSÉ, poet and statesman, was born at Madrid on April 11th, 1772, and was educated for the law. As early as 1791 he began to write poetry, but his first work, *Las Reglas del drama*, dealing with the rules of dramatic art, did not achieve the success he hoped for. It was followed by a series of odes of great distinction, of which that on the "Pantheon of the Escorial" was his best performance in this line. For the theatre he also wrote two tragedies, *El duque de Visco* (1801) and *Pelayo* (1805). During the Napoleonic invasion his patriotism inspired some fine poems. After the warfare he took office under the Government, a step that aroused a certain degree of hostility. In 1814 he became a member of the Spanish Academy, but in the same year the reactionary Ferdinand VII. returned to power and Quintana's Liberalism was rewarded with six years' confinement in Pampeluna. The constitutional epoch that followed the Revolution of 1820 did not last long, however, and Quintana retired to Badajoz to resume his literary work. Returning to Madrid in 1828 he wrote, next year, by request of the King, an *Epitalamio* in honour of his Majesty's marriage to Maria Christina de Bourbon, and between 1830 and 1833 was engaged upon a new edition of his poems, the preface to which is the best example of his prose. He afterwards resumed office (his Progressive opinions having been tempered with trial and unsuccess), became preceptor to the Princess Royal Isabella and her sister Louise and, in 1855, received the rare compliment of being publicly crowned by the Queen in presence of a joint assembly of the two Chambers. He died in Madrid on March 11th, 1857. One of his most important works was *Vidas de los Españoles Celebres*, a series of biographies of famous Spaniards, the first volume of which appeared in 1807.

Quintilian (MARCUS FABIVS QUINTILIANVS) was born at Calagurris (now Calahorra), on the Ebro, Spain, about A.D. 35. He was educated in Rome, whither in 68 he returned with Galba to practise in the law courts. He gained an even greater reputation as a teacher of oratory than as a pleader and had Pliny the Younger as a pupil. He enjoyed the favour of several successive emperors and under Vespasian received a salary from the State. After his retirement from public life he wrote *De Institutione Oratoria*, a treatise in 12 books, remarkable alike for its learning, its purity of style and its good sense. The tenth book contains an admirable survey of Greek and Roman literature. Quintilian died about the year 96. He was probably the sanest and most judiciously-minded literary critic of classic times. He founded himself upon Cicero and his strong point as an advocate was his command of pathos. There is nothing more touching in Latin literature than his lament for his girl-wife and his boy cut off at a promising age. He eschewed philosophy, religion and politics and perhaps the worst point that can be made against him was his fulsome flattery of the Emperor Domitian, whose cruelty at last precipitated his doom.

Quippo, Quipu. [QUICHUAS.]

Quito, the capital of the republic of Ecuador, South America, the highest city of its size in the world, standing on the east slope of Mount Pichincha, 9,520 feet above sea-level, 150 miles N.N.E. of Guayaquil. The Jesuits' college and university, the cathedral, the Government buildings and the palace of the nuncio are the principal buildings. Earthquakes have frequently devastated the place. Iron and steel goods, indigo, hides, india-rubber and agricultural produce form the chief exports; but, as Quito has but scanty means of communication with the outer world, trade languishes. Cotton and woollen goods, silk, lace, thread, blankets, carpets, leather, jewellery and confectionery are produced for home consumption. Quito—the city of the Quitus, a race akin to the Quichuas of Peru—was conquered by the Spaniards in 1533 and raised, eight years later, to the rank of a city by Charles V., but it was not until 1822, on the liberation of the country, that the Spanish yoke was cast off. Pop. estimated at 80,000.

Quoad Sacra. In Scotland there are civil and ecclesiastical parishes. These latter can be constituted by order of the Court of Session, which has the power to unite and divide parishes and also to detach from a civil parish a prescribed area and erect it into a parish *quoad sacra*—that is to say, into a parish wholly and solely for ecclesiastical purposes, the area being, as regards all other affairs, part and parcel of the civil parish.

Quoits, a game which consists in throwing a flat ring of iron at some fixed object. It is played between two iron pins called "hobs," which are fixed in the ground, usually a bed of clay, about nineteen yards apart, the object of the thrower being to make his quoit fall in such a position that the hob shall be surrounded by the ring. This

secures a double score, the scoring being otherwise regulated by the nearness of one player's quoits to the hob compared with those of his adversary. The antagonists may be either single players or several players arranged in two sides. Each player throws two quoits, the diameter of which is limited by rule to eight inches, the weight being undetermined. After each round the players remove to the opposite hob. In throwing it is necessary to give the quoit a slightly rotary motion by means of the wrist, for which purpose a notch is made in the quoit's edge which enables the thrower to put on the spin as the quoit travels hobwards. Deck quoits is a modification introduced to relieve the tedium of long sea voyages. In this variety the quoits consist of strong rope rings and the hobs of wooden pegs resting on stands of broad base. The take-off mark is a matter of arrangement between players or sides, and so is the number of ends that have to be played.

Quorum originally denoted those justices of the peace in whose absence trials could not be held. The expression arose through the manner in which commissions were worded; it is stated (in Latin) that the body in question is to consist of certain members, *quorum unum A. B. esse volumus* ("of whom we will that A. B. be one"), or some such phrase being added. The term now merely denotes the number of persons belonging to any body who must be present in order that business may be transacted. This should be expressly stipulated in the constitution of the body and not left to chance or the decision of a minor authority. In the House of Commons forty members form a quorum.

Quotidian Fever. [AGUE.]

R

R, the eighteenth letter of the English and the seventeenth of the Latin alphabet, derived through the Greek ρ from the Phœnician *Resh*. It is classed as a semi-vowel or liquid. In most languages and even in Central and Southern English before vowels it is a trill or broken murmur produced by raising the tip of the tongue up close to the palate and making it vibrate by an emission of voiced breath and then lowering the tongue-tip. There are several varieties of this sound, of which the ordinary English variety is the weakest, being either a slight murmur or quite suppressed before consonants, or when final, as in *art, ever*; but in these positions and sometimes also when followed by mute *e* the preceding vowel is modified, as in *port, first, curd, word, horse, per, fir, fur, for, here, pure, sore, care*, while *a* before *r* and a consonant, or accented before final *r*, retains its old open sound and *ar = a*, as in *art, harm, farre, guitar*. The *r grassy* is formed by the vibration of the uvula and velum pendulum. The same sound is given to *rr* as to *r*; e.g., *carrot, carol, ferry, very, florid, torrid, card, charred*. In several languages—e.g., in English and Latin—*r* has succeeded a

voiced sibilant (English *z*), as in *harc* for Teutonic *haza*. From its suggestion of the growling of a dog the Latin poet Persius called it *littera canina*. In England the Northumbrians sound it with a very pronounced burr, while in London and elsewhere a defective ear places *r* at the end of words ending in *a*, as "Mariar."

Raab, or GYOR, capital of the county of Raab, Hungary, at the confluence of the Raab with an arm of the Danube, 67 miles W.N.W. of Budapest. The principal buildings are the 12th-century cathedral (restored), the Town Hall, the bishop's palace and the municipal buildings. The manufactures include machinery, agricultural implements, cloth, cutlery and oil. It has a well known market for horses and grain. It was the Roman Arabona and, during the Middle Ages, a place of some consequence. The Turks captured it in 1594, but were dispossessed four years afterwards. The attempts to hold the town against the Austrians in the revolutionary era of 1848-9 were fruitless. Ten miles to the south-east is the abbey of St. Martinsberg, the oldest and richest in Hungary. Pop. (1900), 27,980.

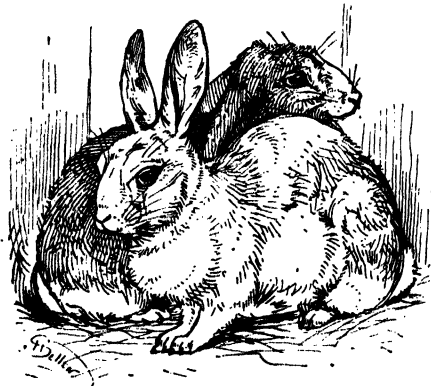
Rabanus (HRABANUS), surnamed MAURUS by Alcuin, his master, was born at Mainz about 775 and died at Winkel on the Rhine on February 4th, 856. He became Abbot of Fulda in 822 and Archbishop of Mainz in 847. He was author of several learned works, such as *De Univesso, sive Etymologiarum Opus*, and a Latin-German glossary to the Bible.

Rabat, or SALLEE-RABAT, a fortified seaport of Morocco, 130 miles S. of Cape Spartel, at the mouth of the Bu-Regreg. A great many European imports pass hence into the interior and the wares of the country, such as wool, olive oil, corn and goatskins, are exported to northern markets. It has manufactures of cottons, woollens, silks, pottery and carpets. The buildings include the citadel, the arsenal, mosques and mausoleums. Sallee, on the other side of the river, is now a poor place. It was formerly the den of pirates who gained an unenviable reputation for Morocco. These ruffians' vessels—"often owned," according to Dr. Robert Brown, who knew the coast and its people intimately, "and always countenanced by the Sultan, who shared the profits"—occasionally went as far north as Lundy Island in pursuit of Bristol merchantmen. At one time hundreds of British and other sailors—and passengers mayhap—were captured and deported into the interior where (at Fez, Mequinez and other places) they eked out the rest of their days in slavery, unless their friends got to hear of their ill plight and ransomed them, or they tried to escape, or hoped to ameliorate their lot by "turning Turk." Even as late as 1829 Sallee-Rabat was bombarded because these corsairs had had the audacity to seize an Austrian vessel. Pop. of Sallee estimated at 10,000, of Rabat at 35,000.

Rabbi, RABBIN (French), a title of dignity (Aramaic, *rabbi*, "my master," "my lord") given to doctors of Jewish law, properly to those who are ordained for the performance of certain legal and

sacerdotal functions, but loosely applied to distinguished Jewish Hebraists and to any minister of a Jewish congregation. Sometimes the less dignified *rab* ("master," "lord") is similarly used.

Rabbit (*Lepus cuniculus*), a well-known rodent, of the same family and genus as the Hare, from which it differs in its smaller size, greyer coloration and smaller black patch at the tips of the ears and the fact that the hind limbs are not so very much longer than the front pair. The condition in which the young are born also forms a sharp distinction between the two. Those of the rabbit come into the world blind, naked and quite helpless and are brought forth in a burrow which the mother digs for that purpose and lines with fur plucked from her body. Those of the hare are clothed and can see when born. Hybrids between the hare and the rabbit are fertile and are said to be fertile with either of the parent species. The home of the rabbit is generally supposed to be Spain (which has even been described as "the land of conies"), or at any rate the western part of the Mediterranean basin, whence it has spread northwards throughout the temperate parts of Western Europe. The cold of Scandinavia and North Russia has prevented these animals from finding a home in those regions. In England it is common enough. It was not introduced into Scotland and Ireland till quite recent times, but owing to its fecundity, which is proverbial, it has spread over both these countries. Rabbits begin to breed when about six months old and there may be from four to eight litters in a year, with rarely less than three and sometimes as many as eight in a litter. The most notable instances of the rapid spread of this animal and the damage occasioned thereby are to be found in



TAME RABBITS.

Australia and New Zealand, where wild rabbits were turned out about the middle of the 19th century. In a short time they multiplied to such an extent as to become veritable pests, eating and spoiling the sheep-feed and thereby seriously injuring the sheep-farmers. Many expedients have been tried to keep down their numbers. Traps, poison and the virus of fowl-cholera have been

tried, but these remedies together have done little to mitigate the scourge. New South Wales alone spends about £100,000 a year in endeavouring to cope with the rabbit plague. The turning-out of weasels and stoats has been suggested, but the remedy might be worse than the disease. In some cases, though obviously at immense cost, they have been excluded from great areas by wire fencing. But the whirligig of fashion, like that of time, occasionally brings in compensation, if not revenge, and the people of districts where the rabbit has proved a scourge often make more money by the furs of the creatures than by the food-stuffs they consumed. Local varieties of the rabbit occur in the Falkland Islands and in Jamaica. In Porto Santo, one of the Madeiras, is a dwarf-race, the limb-bones of which are little more than half the size of those of an English wild rabbit. Wild rabbits are social animals and on light sandy soils their burrows are very numerous, a tract of ground where such burrows exist being called a warren. They affect a light sandy soil and in wet moors often make their burrows in matted heather and the long herbage. Cases are on record where they have made their homes in the hollow trunks of decayed trees. They feed on grass, herbs, green crops and the tender bark of young trees and, where they abound, inflict considerable loss on farmers and market-gardeners. In some cases rabbit-farming seems to have been profitably carried on. The fur is used for hat-making and the flesh is valued for food. Besides the large quantities sent from rural districts into London, it is estimated that considerably over 100 tons a week are shipped to England from Ostend during the winter. These last are tame rabbits bred in hutches by the Belgian peasantry. It would seem as if this cottage industry might be advantageously developed in the United Kingdom. Domesticated rabbits have run into a great number of varieties, amongst which is an albino race, with red eyes, as firmly established as is its natural enemy, the ferret. Tame rabbits are easily kept and breed freely in confinement. Cleanliness, dry hutches and a mixture of hard with green food are the principal points to be borne in mind in order to ensure success. Opinions differ as to giving water to tame rabbits; the need for it depends greatly on the nature of the food, but does, after bearing young, should have a supply.

Rabelais, FRANÇOIS, the great humorist, is traditionally said to have been born at Chinon, department of Indre-et-Loire, France, the son of an apothecary or tavern-keeper. The dates of his birth vary between 1483 and 1495, though 1490 seems to be in most favour. He is certainly known to have been a brother of the Franciscan house at Fontenay-le-Comte, in La Vendée, which in 1524 he left for the house of his friend Bishop Geoffroy d'Estissac at Maillezais. Though henceforth nominally a Benedictine monk, he was allowed by Pope Paul III. to practise medicine, which he studied at Montpellier. Here he graduated and lectured on Galen and Hippocrates. The most fruitful period of his life was that which Rabelais spent at Lyons (1532-5), where he frequented the society of Étienne Dolet,

Bonaventure Despériers and Clément Marot and produced his masterpieces. He next became physician to Cardinal Jean du Bellay (with whom he is said to have been at school) and went with him to Rome (1533). He afterwards entered the service of Du Bellay's elder brother, Guillaume. After a period of disgrace, during part of which Rabelais practised as a physician at Metz (1547), he gained Court favour by a letter to the Cardinal de Guise, to whom he wrote an account of the birth of the second son of Henri II. He was then appointed *cure* of Meudon (1550), which, however, he resigned in two years. He died in Paris on April 9th, 1553. Rabelais is supposed to have edited *Les Grandes et Inestimables Chroniques du Grand et Enorme Géant Gargantua*, which appeared at Lyons in 1535. The first book of *Pantagruel* was published in 1533; but it is not certain whether the real *Gargantua* preceded or followed the latter. These works appeared under the name Alcofrabas Nasier. The third book, specially licensed by the king (Francis I.), followed in 1546 and the fourth in 1552. They were afterwards condemned by the Sorbonne and the sale was for some time suspended by the Parlement. Under allegorical stories of much learning and humour, but great coarseness, they convey wise condemnation of prevalent ecclesiastical and educational abuses.

Rabies, or HYDROPHOBIA. The symptoms of hydrophobia in the dog are sullenness, restlessness, loss of appetite, filthy habits (such as eating its own excrement) and an obvious alteration in the sound of its bark. It manifests great thirst, and its ordinary habits and ways are markedly changed. Stray and pet dogs are the most liable to develop dangerous symptoms. If a suspected dog bites anyone it should not be killed at once, but securely chained to see whether or not it will exhibit undoubted signs of rabies, since the discovery that the animal displays none of the dreaded symptoms affords to the victim of its bite a mental relief the effects of which it is impossible to exaggerate.

Raccoon, or RACCOON, a mammal belonging to the American genus *Procyon* of the bear-like section of Carnivores, with two or three species. The common form or "coon" (*Procyon lotor*) is North American and derives its specific name of "the washer" and its German designation of Waschbär, or "Washing Bear," from its habit of dipping its food in water. It is about the size of a large cat, with long brown hair and bushy tail, marked with dark rings. Its somewhat tip-tilted nose gives the creature an inquisitive look which by no means belies its character, for it will examine everything animate or inanimate, the latter being frequently carried off and carefully washed. It is decidedly cunning, and in captivity, if allowed any liberty and there are poultry about, will sooner or later lie down with a fowl inside of it. When eating it generally sits up on its haunches and holds the food with both fore paws. Raccoons are nocturnal and arboreal, descending from trees only in search of food—chiefly aquatic animals and corn—and

hibernating in winter. The skin is a valuable fur, and the animal is therefore hunted or trapped. The Crab-eating Raccoon (*Procyon cancrivorus*) is



RACCOON.

a South American species with shorter fur and more slender shape. It is not so handsome as its North American relative, which it resembles in structure and habits.

Raccoon-Dog, Raccoon-Dog. [Dog.]

Raceme (from the Latin *racemus*, "a bunch of grapes"), the term applied in botany to a type of inflorescence in which the main axis or pedium is elongated, its terminal bud being the last to unfold, whilst lateral buds succeed one another indefinitely and acropetally. A simple raceme has but one order of branches, as in the mustards, cresses and most Cruciferae; the bunch of grape-blossoms, being repeatedly branched, is a compound raceme. The spike differs only in its sessile flowers. When the lower flowers have longer pedicels, so as to bring them to a level with others produced later, the raceme is corymbose, as in the wall-flower. When the flowers are all borne on one side of the axis, it is a dorsiventral raceme and will often become scorpioid, as in the forget-me-not. The raceme may be dense, with flowers closely ranged, or lax, with them wide apart; bracteate, as in the wild hyacinth, or ebracteate, as in the Cruciferae.

Racemic Acid is an acid, isomeric with tartaric acid, being represented by the same formula, $C_4H_6O_6$. It appears to consist of two isomerides, which act upon polarised light to an equal extent, but in opposite directions, so that the racemic acid is optically inactive. It may also be split up by suitable means into the two forms and, owing to the peculiar form of isomerism, the term *racemates* has been extended to all such compounds, *i.e.*, inactive isomers which owe their inactivity to the presence of two optically active isomers in equal proportions. In its chemical character it resembles tartaric acid in almost all particulars.

Rachel (*Félix*), ÉLISA, tragedian, was born at Muri, in the canton of Aargau, Switzerland, on March 24th, 1821, her parents being Alsatian Jews. She and her sister sang in the streets of French cities and were taken in hand by Étienne Choron, a well-known teacher of music. Discovering, how-

ever, that Élisabeth showed more aptitude for acting, he placed her with Pagnon Saint Aulaire, who taught her elocution. She made her *début* at the Gymnase in 1837 in *La Vendéenne* without attracting much attention, but gained her first great success in 1838 at the Comédie Française, in *Les Horaces*, after which she carried all before her, making the classical drama pay better than modern plays. Her chief rôles were taken from the tragedies of Corneille and Racine, *Phèdre* (first played by her in 1843) being a magnificent example of the pathetic. She also acted with great success in some modern plays, particularly in *Adrienne Lecouvreur*, which Legouvé and Scribe wrote specially for her. In 1841 Rachel was well received in London and she afterwards appeared in the chief cities on the Continent and in the United States. She died of consumption at Cannet, near Toulon, France, on January 3rd, 1858. She always considered that the triumph of her life was her singing of the "Marseillaise" nightly at the Comédie Française during the Revolution fever of 1848, but "*Phèdre*" was her master-rôle.

Rachis, now sometimes spelt, more strictly in the Greek form, *rhachis*, is an axis of any kind; but is used most generally for the prolongation of the leaf-stalk or petiole in a compound leaf beyond the lowest leaflets, thus corresponding to the midrib of a simple leaf. A simply pinnate leaf will have but one rachis; but in a bi-pinnate leaf there are secondary rachides as well as the primary one; and there may similarly be tertiary rachides. The stem or shaft of a feather as distinguished from the web (or vexillum), and particularly from that part of the stem which bears the web, is also known as the rachis.

Rachitis. [RICKETS.]

Racine, a town in the county of the same name, Wisconsin, United States, on the western shore of Lake Michigan, at the mouth of the Root, 23 miles S. by E. of Milwaukee. Among the principal buildings are Racine College (founded in 1852), St. Catherine's Academy and Taylor Orphan Asylum. The manufactures include machinery, agricultural implements, carriages, waggons, leather, oils and chemicals, machine-shop products, gloves, boots and shoes, iron-, copper-, and brassware, besides brewing and iron-founding. The town dates from 1834. Pop. (1900), 29,102.

Racine, JEAN, dramatist and poet, was born at La Ferté-Milon, department of Aisne, France, in 1639, his father being a solicitor. He was educated at Beauvais and at Port Royal and was for a time assistant steward to the Duc de Luynes. Showing a strong inclination to lead the life of a young man of pleasure at Paris in 1661 his relations—decent, pious people, with a horror of the theatre—had him sent to Uzès. Two years later he returned to Paris and gained the favour of Louis XIV. by some courtier-like odes, while he also became intimate with Boileau, La Fontaine and Molière. Racine's first period lasted from 1664, when *La Thébaine* was played at the Palais Royal by Molière's company, to 1677. *Andromaque* was produced in 1667, *Les*

Plaideurs in 1668, *Bajazet* in 1672, *Mithridate* in 1673, *Iphigénie* in 1675 and *Phèdre* in 1677. A quarrel with Molière (little to Racine's credit) arose out of the production of *Alexandre le Grand* (1665). *Phèdre*, perhaps Racine's masterpiece, was unsuccessful at the time owing to a powerful opposition, who hired an inferior dramatist to produce a play on the same subject immediately after it was performed. He was received at the Academy on January 12th, 1673, and about the same time made a bitter onslaught on Port Royal, which disapproved of players. From his marriage in 1677, however, he returned to the Jansenism in which he had been brought up, but was none the less a highly-successful courtier, being made with Boileau historiographer-royal and accompanying Louis in his campaigns. (Unhappily the work of the collaborators was destroyed in a fire in 1728.) His second period began in 1689 with *Esther* and ended with *Athalie* in 1691. Racine was a perfect master of verse and of a certain thin passion, but lacked vigour; his relation to Corneille is that of Pope to Dryden. He died in Paris on April 21st, 1699. *Phèdre* has always appealed strongly to the greatest tragedians, Rachel and Sarah Bernhardt's renderings of the title-rôle counting among their very finest impersonations.

Rack, an engine of torture consisting of a platform, at one end of which was a fixed bar to which the two hands of the victim (laid down at full length) were bound, at the other end a revolving bar to which both legs were attached by cords which were rolled round the bar by a windlass and thus tightened so as to stretch the body even to dislocation of the joints. In some instruments both bars revolved and in others the bars were drawn in opposite directions.

Rackets, a modern variety of tennis played in a closed court with balls (one in use at a time) and a bat called a racket, the blade of which is formed of a network of cord or gut stretched on a frame of bent wood. The ordinary dimensions of a court are 60 feet long by 30 wide and 40 high, the four walls (at right angles to each other) being painted black, so that the ball may show up readily (in the tropics black balls are used against white walls). On the front wall (which the player faces) is drawn the service line at 8 feet from the floor and another at 2 feet 2 inches from the floor called the play line. About half way down the court is marked out on the floor (on each side) a service box about 8 feet square, and a line is drawn across the floor from wall to wall about the middle of the court, and from this line to the back wall the court is bisected by a line into the two playing courts. The game may be either single-handed or for doubles (two a side). The server standing in his box drives the ball to the front wall above the service line so that it shall rebound into his opponent's court. If it strike the front wall otherwise than as described or fall into the wrong space, it is a fault and may be declined, two faults putting the player out. The adversary returns every good service to his opposite court, the ball being taken either at the volley or half-volley. The

game consists of 15 points or aces. For details of the play the rules of the game should be studied. The old debtors' prisons and public-houses were formerly the places where the game had its chief vogue, but since 1820 or thereabouts it has been regularised, its laws have been codified and it is now played at many public schools, Oxford and Cambridge Universities and Queen's Club, London.

Radcliffe, a town of Lancashire, England, 7 miles N.N.W. of Manchester. It takes its name from the red rocky cliff on the south-eastern side of the Irwell, which flows through it. The principal buildings are St. Bartholomew's Church (restored), dating from the close of the 13th century, and the market-house. The manufactures include cottons and other textiles, besides dyeing, bleaching, paper-making, iron-founding and the making of machinery. There are also coal-mines in the vicinity. Radcliffe Tower, now in ruins, was the residence of Richard Radcliffe, High Sheriff of Lancashire in 1303-4, from whom were descended the Radcliffes, Earls of Derwentwater, the last of whom (James, 3rd Earl) perished on the scaffold at Tower Hill in 1716 after the first Stewart rising, when part of his estates were forfeited and settled upon Greenwich Hospital. Pop. (1901), 25,368.

Radcliffe, ANN, novelist, daughter of William Ward, a tradesman, was born in London on July 9th, 1764. At the age of 23 she married at Bath William Radcliffe, afterwards proprietor and editor of the *English Chronicle*. She soon afterwards took to writing fiction, her first considerable successes being *A Sicilian Romance* (1790) and *The Romance of the Forest* (1791). These were followed by her masterpiece, *The Mysteries of Udolpho* (1794), for which she received the then remarkable sum of £500. For *The Italian* (1797), a romance of the Inquisition, by some regarded as equal if not superior to its predecessor, she was paid £800. Thereafter she practically abandoned writing for the press. Her works, dealing with ruined abbeys and castles, were highly popular in their day and mark the middle stage of the romantic movement which reached its zenith in Sir Walter Scott. She died in London on February 7th, 1823.

Radcliffe, JOHN, physician, was born at Wakefield, Yorkshire, in 1650 and educated at Wakefield Grammar School and University College, Oxford. He practised medicine in Oxford till 1684, when he removed to London. At the end of the 17th century he was the chief physician of repute and attended William III. and Queen Mary. He was very ill when Queen Anne died and became unpopular on account of his inability to attend her in her last illness. He could not afterwards be seen in London without personal danger. He died at Carshalton, in Surrey, on November 1st, 1714, and was buried in St. Mary's Church, Oxford, on the 3rd of December. To his munificence was due the building of the Camera, now an adjunct to the Bodleian Library at Oxford (sometimes called "The Radcliffe"), the Radcliffe Infirmary, and the Radcliffe Library, while St. Bartholomew's Hospital, London, and other institutions benefited under his will.

Ra-dê (ROE-DEH), a people occupying a district of Cochinchina, South-eastern Asia, north-east of Saigon, quite distinct in physical appearance and speech from all the surrounding Mongoloid aborigines. They appear to be of Khmêr (Cambodian) stock and are remarkable for their European features. They are skilled weavers, wood-carvers and potters and live in large communal houses like those of the Pueblo Indians of North America, but less substantially constructed.

Radetzky, JOHANN, GRAF VON, field-marshal, was born near Tabor, in Bohemia, on November 2nd, 1766, and entered the Austrian army in 1784. He served against the Turks and throughout the Napoleonic wars and was chief of the staff at Leipzig. He commanded in Lombardy in 1831-36 and in the last year was made field-marshal; but his greatest glories were in his old age, when he defeated the Sardinian armies at Custoza (1848) and Novara (1849). He was then appointed Governor of Lombardy, which he had preserved for Austria. He retired from the army after active service of seventy-two years and died at Milan on January 5th, 1858.

Radiata, a term devised by Baron Cuvier and advocated by Louis Agassiz for one of the four principal divisions of the Invertebrates. It included those in which the parts are arranged radially from a centre instead of being bilaterally symmetrical and therefore comprised the Coelenterata (Corals, Jellyfish, Sea-anemones, etc.) and the Echinodermata (Sea-urchins, Starfish, Brittle-stars, etc.). The classification, however, was ultimately abandoned, as the Coelenterata and Echinodermata are not closely allied.

Radiation is the propagation of ethereal waves. If these waves are caused by comparatively slow vibrations, they can only be detected by electrical means. As the speed of vibration becomes quicker they become evident as heat and, when the speed has been further increased, they can be perceived by the eye as light. A condenser whose discharge is oscillatory sets up ethereal vibrations which are essentially the same as heat or light vibrations. A condenser of large capacity may start waves a thousand miles long, but on discharging a Leyden jar of minute dimensions waves only a few feet in length would result; and if we were able to obtain a circuit so small that its dimensions were comparable with those of an atom, then without doubt waves 25-millionths of an inch long would be produced and be able to affect our eyes; they would in fact be light-waves. Electric disturbances and light both travel at the same speed in space, the velocity being 187,500 miles per second. In matter this equality of speed is not always obtained, for the speed of waves of different wave-lengths is retarded differently. We know that the shorter waves of light, *i.e.*, those at the blue end of the spectrum, are retarded more than longer ones at the red end, although the latter are only about twice as long as the former, so that we should expect some difference when we are dealing with waves many millions of times greater. It has been

calculated that if a Leyden jar could be obtained to discharge an atomic charge, the wave-length of the oscillations would be that corresponding to the invisible rays at the violet end of the spectrum; and it may be due to this connection that the ultra-violet rays have so great a chemical action. Molecules are often considered to consist of electrically-charged atoms; when heated they vibrate mechanically and thus also excite an electric radiation. Many of their different rates of vibration give rise to light and the science of spectroscopy deals with the measurement of these different rates. Imagine a system of waves meeting a substance whose insulation is perfect; some of the radiation will be reflected and some transmitted, but none will be lost. If, however, it meet a conductor, no radiation will be transmitted; it will all be either reflected or lost. A conductor of electricity will therefore be opaque to light; this is exemplified by the fact that metals—which are good conductors—are opaque even when extremely thin. On the other hand, a transparent body must be an insulator. A perfect conductor would totally reflect radiations of every wave-length and no dissipation would occur. In an ordinary conductor some of the radiation is destroyed; the vibrations of the ether are converted into vibrations of the atoms and heat is produced. Radiation can be affected by matter in different ways; it can be reflected or refracted, undergo diffraction, dispersion, or absorption, or be polarised. We are accustomed to the idea that light and heat are not different in essence; but the conception that electrical disturbances are also the same in kind is not quite so general and it was left for James Clerk Maxwell (1831-79) to show that light is produced by electrical vibration.

Radical, in British politics, describes either the party, or a member of it, that favours thoroughgoing—so to say, root and branch—reform. Though the word in this sense does not occur in Dr. Johnson's *Dictionary* it began to be applied, soon after his time, to those who agitated in favour of Parliamentary reform. Its scope was broadened at a later period to include other drastic measures such as separation of Church and State, Adult Suffrage, the Abolition of the House of Lords and other proposals of a progressive character. The Chartists were Radicals in all but name. It was once thought that W. E. Gladstone had defined a Radical as "a Liberal who is in earnest," but on being appealed to in 1882 on the subject he disclaimed the express definition, though he "had probably said that he had known times when the name Radical was so applied *ad invidiam*."

Radical Theory. The researches of Joseph Louis Gay Lussac (1778-1850) on cyanogen compounds showed that in many compounds the group CN entered into reactions as if it were a single elementary atom, while other researches proved that many similar groups existed which remained unaltered during many transformations of the substances in which they existed. In this way chemists endeavoured to explain the composition of organic compounds by supposing them built up of such atomic groups or radicals. The views upon the

nature and characters of the radicals and their compounds formed the subject of much controversy during the latter part of the first half of the 19th century, Jöns Jakob Berzelius (1779-1848) and Baron von Liebig (1803-78) taking the most prominent parts. Although many errors crept into their views, the influence of the older radical theory in the generalising and co-ordinating of chemical ideas was exceedingly great and laid the foundation for other more advanced views afterwards promulgated.

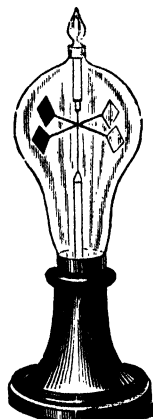
Radicle (pronounced with the accent on the second syllable) is the primary root in its embryonic stage. It occurs temporarily in ferns, horsetails and palms; but in most gymnosperms and dicotyledons develops into a tap-root of a permanent character.

Radiolaria, a class of Protozoa belonging to the Rhizopoda and including some of the most specialised of the Protozoa. They nearly all have a skeleton, which is formed usually of silica, but in one group (the Acantharia) it consists of a substance allied to chitin and called "Acanthin." The structure may be simple, consisting only of spicules, as in the Beloidea, which may be fused at one end or be embedded in some organic matrix; as a rule the skeleton is complex, being composed of a series of rings, spines, or variously-shaped arrangements of lattice-work. The body is divided into two parts, a central capsule and an extra-capsular region. These are usually separated by a membrane pierced by numerous fine pores (Porulosa) or one or more apertures (Osculosa). The extra-capsular region is supported by a gelatinous skeleton known as the calymna in addition to the silicious or acanthin skeleton which it usually surrounds. Reproduction is effected by budding, fission, or the development of spores; the first is rare and the last is the normal method. There are two kinds of spores: isospores and anisospores, of which the latter are sexual and the former asexual; an "alternation of generations" therefore takes place. The Radiolaria are all marine and are commonest in tropical seas far from land, living either on the surface or at great depths. They occur less sparingly even in Arctic seas. They are known from very early geological ages; rich faunas are met with in the Lower Silurian (Ordovician) rocks and it has even been claimed that they occur in Pre-Cambrian rocks; in that case they would be the oldest form of life. They are small in size, the simple ones being rarely more than $\frac{1}{2}$ of an inch in diameter; a few, however, are an inch in diameter, while some compound ones (*Collozoum*) may be a foot in length. Nevertheless, they are of great geological importance, as they form thick deposits as in the Barbados (late Tertiary in age), in Jurassic, and Palaeozoic cherts, and in some "phtanites" in the schists of the Cottian Alps. Their occurrence in some crystals of feldspar (albite) has also been proved. The classification is as follows:—

I. PORULOSA: Capsular membrane penetrated by numerous fine pores.

1. *Spumellaria*: Pores evenly divided: skeleton of silica or absent.
 2. *Acantharia*: Pores in lines or groups: skeleton of acanthin.
- II. *OSCULOSEA*: Capsular membrane with one or more large pores.
3. *Nassellaria*: a porous aperture at one end of the axis.
 4. *Phaeodaria*: the main aperture is surrounded by a phaeodium—a mass of rounded green bodies which may be algae living with the radiolarian.

Radiometer is usually a glass vessel containing highly rarefied air. Light vanes are carefully balanced on an axis about which they are free to rotate. If two equal discs are balanced on an arm, and a light be allowed to shine on them, nothing will happen; but if alternate sides be coated with lampblack, rotation will begin in a direction such that the blackened side moves backwards as soon as a candle or other light is brought near. This is due to the fact that the blackened face gets hotter than the mean temperature and the difference of pressure on the two sides causes motion. Sir William Crookes found that a rotation could also be obtained by using unblackened vanes if the shape were altered. He therefore balanced four vanes on two arms and bent them at the ends; heat then fell upon the convex side of one vane and the concave side of another and rotation occurred. If, further, the vanes be plane and of the same appearance, but of different materials, *e.g.* one of chromic oxide and one of copper tungstate, rotation will occur. It has also been shown that the effect varies with the light used. The cause of the motion has been discussed by Osborne Reynolds and by James Clerk Maxwell.



CROOKES' RADIOMETER.

Radiophony. When a beam of light falls on a body, such as lampblack, capable of absorbing heat, the body expands. If a succession of flashes occurs, the lampblack will alternately expand and contract, *i.e.*, it will vibrate and this vibration is capable of emitting sound. If the lampblack be contained in a tube connected with a sounding-board whose frequency of vibration is the same as that of the flashes, the sound will be audible to some distance. Professor Graham Bell (*b.* 1847) has shown that practically all substances are capable of thus converting radiant into acoustical energy.

Radish (*Raphanus sativus*), possibly a cultivated race of the wild radish (*R. Raphanistrum*), from which it differs in its enlarged tap-root and non-articulated seed-pod; it is a hardy annual

cultivated from early times from Japan to Europe for its edible roots. It belongs to the order Cruciferae and has the pungent antiscorbutic properties of the order. The root is fusiform or napiform and red, white or brown. The flowers vary from white to pale violet with darker veinings and the pods are smooth and pointed. The roots, when large, can be eaten boiled; but their main use is as a relish or raw ingredient of salad.

Radium (symbol, Ra; atomic weight, probably about 225) appears to be widely though sparsely distributed, but is chiefly obtained from the pitchblende from which Uranium has been extracted. The best material for this purpose is derived from Bohemia, but even this only contains a few grains to the ton. It can be easily understood that the process of extraction is therefore a long and tedious one. The pitchblende, after the removal of the Uranium, is boiled with a concentrated solution of carbonate of soda and the residue dissolved in hydrochloric acid. The Radium and other metals are then precipitated in the form of insoluble sulphates by the addition of sulphuric acid. They are then transformed into chlorides and bromides and separated by means of fractional crystallisation. It was in this form that Radium was discovered by M. and Mme. Curie in 1902. The element itself has up to the present not been isolated, so that the atomic weight given above is a purely theoretical one. Its discovery has proved one of the greatest scientific sensations of recent years owing to its very remarkable property of radiation. Becquerel had, in 1906, discovered that Uranium and Thorium compounds had this property, but to nothing like the same extent as has been found to be the case with Radium. Exactly what radiation is has not been definitely decided, but some clever work has been accomplished by E. Rutherford and F. Soddy, who have done much to extend our knowledge of the subject. According to their theory the rays are due to the gradual disintegration of the Radium atom, the inert gas Helium (symbol, He; atomic weight, 4) being given off and a substance with an atomic weight of 221 formed. This in its turn throws off Helium, resulting in a further reduction by 4 in the atomic weight. That it is Helium that is given off has been demonstrated by Sir William Ramsay and Soddy, who condensed the emanation in an exhausted tube, and by means of the spectroscope demonstrated the presence of Helium. The process of disintegration can be carried on till a substance, probably Polonium, with atomic weight of 209 is reached. The intermediate substances Rutherford has called Radium A, Radium B, etc. The first of the intermediate substances after Radium, *i.e.*, the Radium emanation with atomic weight of 221, belongs without doubt to the family of elements discovered by Lord Rayleigh and Sir William Ramsay (Helium, 4; Neon, 20; Argon, 40; Krypton, 82; and Xenon, 128). The rays from Radium Rutherford has divided into three classes, α , β and γ . The α rays are the most important and form over 90 per cent. of the total radiation. These form the scintillations seen in the Spinthariscopes invented by Sir William Crookes,

each particle producing a flash of light on impact with the zinc blende crystal. The β rays are similar to the cathode rays and consist of negatively-charged ions, the mass of which is about one-thousandth that of hydrogen and velocity one-third that of light. Like the cathode rays they are deviated by a magnet, but with much greater difficulty. The γ rays are similar to Röntgen rays, but are much more penetrative and cannot be deflected by a magnetic field. During this process of disintegration the Radium atom evolves enough heat to raise a similar weight of water from freezing-point to boiling-point in one hour, which is roughly one million times greater than the heat given out by an equal weight of burning coal. Thus an almost continuous source of energy is provided. That the source is not quite continuous is apparent as the atom is gradually breaking up, though the process is extremely slow. Rutherford and Soddy estimate the life of the Radium atom at 1,885 years, and the life of Uranium, from which Radium is probably obtained, by the same process of disintegration, at 500,000,000 years. The life of the Polonium atom, which, as already mentioned, is lower down the scale, is estimated at 207 days. This theory of what takes place in the Radium atom is in close accord with the preconceived theory of the ionic formation of atoms, and there is no doubt but that these great discoveries have carried us very far in the search for fresh scientific knowledge, and opened up a new field of speculation as to the length and character of the past history of the earth and the maintenance of the heat of the sun and planets.

Radius, any line drawn from the centre to the circumference of a circle.

Radius of Gyration of a body with respect to an axis is the distance from the axis at which the whole mass of the body should be placed in order that its moment of inertia about that axis should remain the same.

Radius Vector, a line drawn from a centre of force to a body describing an orbit round that centre. It is a term of special application in astronomy, where it usually denotes the line drawn from the sun to the position of a planet at any time.

Radnorshire, an inland county of Wales, bounded on the N. by Montgomeryshire, on the E. by Herefordshire and Shropshire, on the S. by Brecknockshire and on the W. by Cardiganshire. It measures 30 miles from north to south, 33 miles from east to west, and covers an area of 432 square miles. The surface is mostly hilly, interspersed with open, fertile valleys. The chief river is the Wye, noted for its picturesque scenery; the Teme, Lugg, Ythan and Elan are smaller streams. The principal crops are oats, barley, wheat, turnips and clover. The hill pastures provide excellent grazing and sheep-farming and cattle-raising are pursued extensively. Dairying also is of considerable importance. Limestone and sandstone are worked and lead and copper occur, but not on a commercial scale. The manufactures

comprise flannels and worsteds. There are chalybeate springs at Llandrindod and Builth. The Silures possessed the land before the Romans, of whose occupation there are still a few remains. The county was formed by Henry VIII. New Radnor, the former capital, was the point where Giraldus Cambrensis began his preaching crusade in 1188 along with Archbishop Baldwin. Presteigne (1245), on the Lugg, is the county town. Pop. (1901), 23,281.

Raeburn, SIR HENRY, portrait-painter, was born in Edinburgh on March 4th, 1756. Orphaned while a boy he was placed, along with his brother, in Heriot's Hospital, where he received a sound education. At the age of 15 he was apprenticed to Gilliland the goldsmith and soon made his mark as a miniaturist. He then attended the 'Trustees' Academy of Art and also the studio of David Martin, but his aptitude was such that he may be said to have been self-taught. In 1778 he married a well-to-do widow, Mrs. Leslie, and though he was now possessed of independent means, he painted portraits with great assiduity and accept-



PORTRAIT OF LIEUT.-COLONEL BRYCE MACMUREDO.
(From the painting by Sir Henry Raeburn, R.A.)

ance. In 1785 he went to Italy, calling on Sir Joshua Reynolds in London and showing him examples of his work. He reached Edinburgh again in 1787 and henceforward all the notable people of the day sat to him. In 1810 he contemplated removing to London, but fear if not jealousy of his powers induced such of the Royal Academicians as he consulted to dissuade him from this project. In 1812, however, he was elected A.R.A. and three years later became a full member. In

1822 he was knighted, and died in Edinburgh on July 8th, 1823. He was a painter of enormous industry and considering the quantity of his output his standard of excellence is amazingly high. His variety in portraiture was unique. He painted children with remarkable charm, as in "The Blinning Boys," and was equally happy with middle life and old age, as in "John Wauchope" and "James Wardrop of Torbanehill." His portraits of women were delightful, those of "Mrs. Scott-Moncrieff," "Miss Janet Suttie," "Mrs. James Campbell," and "Mrs. Campbell of Ballimore," touching the *ne plus ultra* of this branch of art. His full-lengths were masterly in the extreme, in evidence of which such canvases as "Sir John Sinclair," "Dr. Spens," and "Admiral Lord Duncan" may be cited. His capacity for realising character amounted to the intuition of genius; take, for instance, "Lord Newton" and "Henry Mackenzie," author of *The Man of Feeling*. In the auction room his works have enhanced in value almost more than those of any other painter of modern times. In 1903 his portrait of "Sir John Sinclair" fetched fourteen thousand guineas.

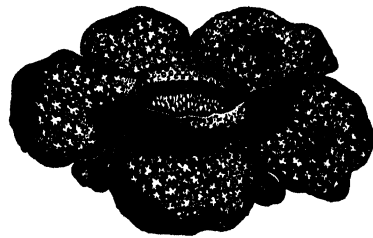
Raff, JOSEPH JOACHIM, composer, was born at Iachen, on Lake Zürich, Switzerland, on May 27th, 1822. He was at first a schoolmaster, but rose to be director of the Frankfort Conservatoire of Music. A protégé of Mendelssohn and a friend of Liszt, he was a prolific composer of symphonies, overtures and concertos, his music for the violin being in especial repute. He also composed a few operas, of which the best were *König Alfred*, *Lame Kobold* and *Samson*. The series of ten symphonies which began in 1863 with *An das Vaterland* displayed great melodic beauty and several of his songs, such as "Kein Sorg um den Weg" and "Schön Else," became established favourites. He died at Frankfort on June 25th, 1882.

Raffa. [RAPHIA.]

Raffles, SIR THOMAS STAMFORD, colonial governor and naturalist, was born at sea off Port Morant, Jamaica, on July 5th, 1781. He was educated at Hammersmith and, at the age of 14, entered the East India House as a clerk. In 1805 he was despatched to Penang and, in a few years, owing to his facility in acquiring the Malay tongue and his administrative capacity, was made lieutenant-governor of Java when that island was annexed to Great Britain in 1811. During his tenure of power he introduced several drastic reforms, putting an end to forced labour, establishing trial by jury and a simple judicial procedure, granting the native regents or chiefs a large measure of self-government and policing the island to a great extent by the natives themselves. He came to loggerheads, however, with General Gillespie, the military commander, who arraigned his whole system of government and he was recalled in 1815, a year before Java was restored to the Dutch. In 1817 he published his *History of Java* and was knighted in the same year. In 1818, when he took up his governorship of Benocoolen, he systematically explored much of Sumatra, discovering the

extraordinary parasitic plant named after him *Rafflesia Arnoldi* and also *Nepenthes Rafflesiana*. In 1819 he accomplished a masterstroke of policy by purchasing Singapore from the Sultan of Johore and hoisting the British flag. During his administration he abolished the slave trade. On the return voyage to England the ship was destroyed with all his papers, drawings and collections, but the passengers were saved. He reached Plymouth by another vessel in 1824. Settling near London, he was mainly instrumental in forming the Zoological Society, of which he became the first President. He died at Barnet on July 5th, 1826.

Rafflesia, an extraordinary genus of parasitic plants, natives of Java and Sumatra, the type of a small isolated order of dicotyledons, taking their name from Sir Stamford Raffles, by whom they were discovered in 1818. It grows on the



RAFFLESIA.

trailing stems of a vine belonging to the genus *Cissus* and has no foliage-leaves or true stem, but consists of one huge flower and a few bracts. The bud is like a cabbage and, when open, the flower reaches two or three feet across, with a five-cleft, fleshy, carrion-like perianth which has a ring-shaped corona. The flowers are dioecious, the anthers opening by a pore and the inferior ovary being one-chambered with numerous ovules. The perianth becomes fly-blown and putrefies.

Ragged Robin, the appropriate popular name for the spring-flowering *Lychnis Flos-cuculi*, owing to the remarkably torn (*lacinate*) condition of its pink petals. The Cuckoo-flower, as it is otherwise called, belongs to the order Caryophyllaceæ and is common in marshy spots. A white-flowered form also occurs.

Ragged School, an institution for the teaching of the poorest children by voluntary effort and the free-will providing of the means for supporting it. The first school was established in effect, if not in name, by John Pounds, a shoemaker of Portsmouth, who for many years before his death in 1839 had made a practice of teaching in his house children of the very humblest and neediest classes. His example was adopted in many large towns, the schools being usually opened in the densest and most squalid districts. In 1846 the Ragged School Union was formed in London, the 7th Earl of Shaftesbury—whose philanthropic activity was the most conspicuous social feature of the Victorian period—becoming President, a post which he held

for thirty-nine years. The Rev. Dr. Thomas Guthrie's *Plea for Ragged Schools*, published in 1847, led to the opening of the Original Ragged Schools in Castlehill, Edinburgh. Everywhere such schools were well supported till the passing of the Education Act in 1870. This absorbed the most efficient schools or compelled the children to attend Board Schools. Almost the only bitterness Lord Shaftesbury permitted his speech was inspired by detestation of the Act which practically had rendered the ragged school unnecessary, although it was essentially promoting the work he had at heart on more competent lines.

Raglan, FITZROY JAMES HENRY SOMERSET, 1st BARON, youngest son of the 5th Duke of Beaufort, was born at Badminton, Gloucestershire, on September 30th, 1788, and educated at Westminster School. At the age of sixteen he entered the army and fought in the Peninsula, serving on Wellington's staff continuously from 1809 till the close of the war. He was made K.C.B. in 1814 and fought at Waterloo, where he lost his right arm. In the following years he performed various diplomatic duties at Paris and held other important posts, becoming military secretary at the Horse Guards in 1827, when Wellington was appointed Commander-in-chief. In 1852 he received the G.C.B. and a few weeks later was raised to the peerage as Baron Raglan, of Raglan, Monmouthshire, becoming also Master-General of the Ordnance. When the Crimean War broke out in 1854 he was appointed Commander-in-chief of the British forces and was present at Alma and Inkerman, being created Field-Marshal after the latter battle (November 5th). The soldiers suffered terribly, however, through mismanagement of the commissariat and Lord Raglan was seriously blamed. The failure of the British attack on the Redan greatly affected him, enfeebled as he was from dysentery, and he died in the Crimea on June 28th, 1855. He was a firm and fearless soldier, if somewhat lacking in the qualities that go to the making of a great general.

Ragman Roll, a parchment roll with pendent seal, the derivation of the word "ragman" being uncertain. It was particularly applied to the collection of instruments by which the Scottish nobility and gentry were constrained to subscribe allegiance to Edward I. of England in 1296 and which were recorded in four large rolls of parchment afterwards deposited in the Tower of London. Since it constitutes almost the only document in the nature of a statistical account of the titled and substantial classes of Scotland towards the end of the 13th century, its value is incalculable.

Ragusa (Slavonic, *Dubrovnik*), a fortified seaport in Dalmatia, Austria-Hungary, on a peninsula in the Adriatic, 38 miles W.N.W. of Cattaro. It is situated at the foot of Monte Sergio and is divided into two parts by the Corso, formerly an inlet of the sea. From the 3rd century until 1808 it was the centre of a small republic, but was incorporated with the Austro-Hungarian Empire by the Treaty of Vienna in 1814. The harbour, protected by stone forts, is small and shallow. Most of the trade has

now gone to Gravosa. The manufactures include silk, leather, oil and liqueurs. The more prominent buildings are the old palace of the rectors of the *quondam* Republic, the cathedral, the custom-house, formerly the mint, the museum and the commercial palace. Pop. (1900), 13,174.

Ragwort (*Senecio Jacobaea*), a very handsome member of the order Compositae, a common weed belonging to the same genus as the rayless groundsel and closely related to the garden Cineraria. It is native to Europe and Northern Asia. It derives its name from its much-divided, rather fleshy leaves. It grows three or four feet high, with a corymbose inflorescence, a foot or more across, of numerous radiate gold-yellow capitula and, as it occurs socially on waste ground, it is very effective. The Golden Ragwort, a North American species, was much used by the Indians for the healing of wounds. The Purple Ragwort is a handsome species from the Cape of Good Hope.

Rahel, IBN, an Arabian chronicler, was born in Egypt and was a Christian. He wrote a chronicle in Arabic of events from the earliest times to A.D. 1239. This work was translated into Latin by Abraham Echellensis and is of extreme rarity. A copy is preserved in the Vatican.

Raiffeisen, FRIEDRICH WILHELM, economist, was born at Hamm, in Westphalia, on March 30th, 1818. Being compelled by injury to his eyesight to leave the army, he spent many years in the Prussian civil service and, in 1846, began to advocate the principles of association and co-operation. Ultimately he founded banks for the benefit of farmers, which in course of time were established not only throughout Germany but in other countries of Europe. He explained his system in *Die Darlehnskassenvereine* (1866) and other works. He died on March 11th, 1888.

Raikes, ROBERT, promoter of Sunday schools, was born at Gloucester on September 14th, 1735. He succeeded in 1767 to the proprietorship of the *Gloucester Journal*, which had been founded by his father in 1722. Interested in schemes of practical benevolence, his efforts to improve the condition of the prison of his native city were praised by John Howard. In 1780 he opened a Sunday school, the success of which was immediate. Others followed and the example thus set was soon adopted in other towns and the movement speedily became general. But Raikes was hardly the founder of such schools, having even in Gloucester a collaborator in the person of the Rev. Thomas Stock (1749-1803), who had started a Sunday school at Ashbury in Berkshire. He was accused of excessive vanity, but appears nevertheless to have been an estimable person. He died at Gloucester on April 5th, 1811.

Rail, a Wading bird belonging to the genus *Rallus*, type of the family Rallidae. The Water Rail (*R. aquaticus*) is fairly common in Great Britain, though it often escapes notice from its shy habits. It frequents marshy ground and its favourite hiding-place is among the thick vegetation near water. The adult male is a little less

than a foot long; general plumage, brown streaked with black, slaty-grey on sides of face and underparts. It is noticeable for its bill which exceeds the head in length, a feature that differentiates the Water from the Land Rail (or Corncrake). Such is the slenderness of the body that, though nearly a foot in length, it is not three inches across the back; hence the bird's facility for threading its way among the reeds. Unless driven by a dog it hardly ever rises and thus is seldom seen, though resident in England all the year round. It is a nimble swimmer and diver, but flies feebly. It nests among the reeds and the eggs vary from six to ten in number.

Railways. At the present time railways form in most countries of the world the chief means of internal communication. Their influence in stimulating industry and in creating new branches of trade since their introduction into England in the year 1825 and into other countries at slightly later periods has been simply incalculable and it is a truism that they have become one of the world's chief civilising agencies. The subject is such a wide one that it can be most conveniently dealt with under the following heads:—

- (a) *History.*
- (b) *Railroad Location and Permanent Way*
- (c) *Signals.*
- (d) *Stations.*
- (e) *Locomotives, Carriages and Waggons.*
- (f) *Statistics of Mileage.*

(a) *History.* In his fine work, *Das Eisenbahngesetz*, Haarrnan traces the history of permanent way back to the times of Strabo, Diodorus Siculus and Herodotus. The history of the railway, however, is not the history of permanent way so much as the history of the locomotive. It was the motive-power in the form of the locomotive that first made railways possible and for the first locomotives we must look back to the times of Nicolas Joseph Cugnot (1769), Richard Trevithick (1802), and William Hedley (1815). But no advance was made in this means of internal communication until the opening of the Stockton and Darlington Railway in 1825 and the famous Rainhill trials, in which the *Rocket* came out victor and established the fame of George Stephenson. Even then considerable opposition from vested interests delayed the spread of railways and it was not until after 1840 and during the speculative time of the Railway Mania that lines were built rapidly. Since then progress in the United Kingdom has been steady and sure and there is but little of importance to record. Other countries have had similar experiences, but in the United States since 1870 railway construction has been surprisingly rapid. The history of railways in the future will probably not be much concerned with construction, as most civilised countries are now covered with complex networks of lines, but will deal with struggles between these wealthy corporations and the State, labour and trade interests. It is not unlikely that other countries may follow the lead of Germany and adopt the principle of State purchase.

- (b) *Railroad Location and Permanent Way.*

It is necessary, before laying down the permanent way of a railway, that careful comparison of all the likely routes between the points to be connected by the line should be made. Definite rules have here only a limited application, as the circumstances vary so greatly in each case. It is wise, however, to avoid heavy grades and curves of small radius as far as possible. Heavy grades always limit the load that can be taken by the locomotive and, if very severe, require double engine-power, this resulting in largely increased expenditure. In level countries, where there is a choice of routes, it is, as a rule, unwise to neglect any points of importance lying at short distances from a direct line drawn between the towns to be connected. By judicious deviations these points can always be served by the main line without greatly increasing its length between its terminal points; the result is, as a rule, large extra traffic. Having decided upon the route the line is to take, the earthworks and cuttings are formed and the bridges erected. The former are sloped according to the nature of the soil and the latter are so constructed as to bear the heaviest loads that will travel over them. Tunnels, viaducts and other large works receive special treatment, according to the conditions governing their establishment. Finally a bed of specially-prepared ballast is laid down, on which what is known as the permanent way is placed. Permanent way consists of sleepers, chairs, keys, fishplates, and rails. The sleepers are in most cases of wood (which is creosoted or otherwise treated to prevent decay), but steel sleepers have also been employed, especially in tropical countries where the white ants play havoc with timber. In nearly all cases sleepers are placed crosswise, though on the Great Western Railway there are many miles of longitudinal sleeper road. This latter gives easier running, but renders repairs to the way very difficult. Chairs, keys and fishplates are fastenings used to connect the rails with the sleepers, or with one another. Rails are now generally made of steel, in sections of about 30 feet long, weighing from 75 to 100 lbs. to the yard. In the United Kingdom the bull-headed type is used, but on the Continent and in North America the broad-base Vignoles or flange pattern, which dispenses with chairs and keys and is simply bolted or spiked to the sleeper, has found favour.

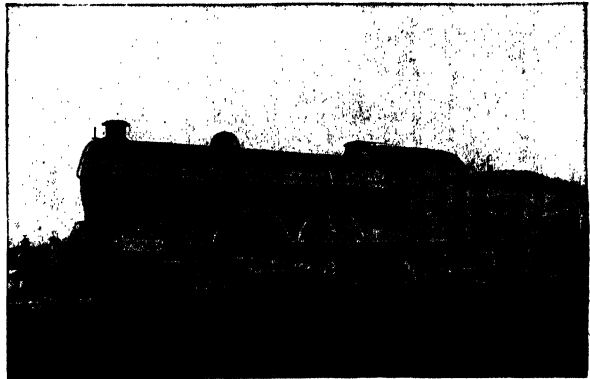
(c) *Signals.* In the early days of railways the methods adopted to warn the driver of danger on the line ahead were exceedingly primitive. As time went on and traffic increased, it was found necessary to devise some more certain means of protecting trains. This resulted in the adoption of the Time System, under which trains were not allowed to follow one another on the same metals until after a certain interval, generally five to ten minutes, had elapsed. Although working well on lines with a small traffic, it was soon found that a space interval was more efficient to prevent accidents than the time interval. This method, at present employed in the United Kingdom almost solely, and on the Continent of Europe and in the United States to a partial extent, is known as the Block System. A line worked on this plan is divided

into sections of various lengths, each furnished with a signal cabin. The signalman, being advised of the approach of a train, asks, by means of special instruments, the man in the box ahead if the line is clear. On receiving an affirmative reply, he is enabled to lower his signals. It will thus be seen that two trains can never occupy one section at the same time and herein lies the great merit of the Block System. It is not sufficient, however to protect trains in this manner, but it is also necessary to ensure that points at junctions should be set for the particular line about to be travelled over before the signal for that line is lowered and that, when once a line is made for a train, all other signals giving access to points fouling this line should be locked at danger. This is effected by interlocking the levers working such points and signals by means of ingenious appliances known as locking frames, located in the signal-boxes. As in the case of the Block System, the United Kingdom considerably leads all others in the interlocking of its points and signals. Numerous clever mechanical devices are in use on railway lines to provide for special cases, such as foggy weather, and to meet emergencies. Signal-posts should, as a rule, be high and have a clear sky background, so as to enable them to be plainly seen by the drivers of on-coming trains. Experience shows that semaphore arms are more easily distinguished than circular discs and that the most convenient colours for signal-lights are red for danger and green for clear. White should never be utilised as a signalling light for the obvious reason that it is already widely used in stations and elsewhere for other purposes and would therefore be very apt to confuse if not mislead. British railways recognise two positions of the arm of the semaphore—at right angles to the post, showing a red light, both signifying "danger" or "stop"; at a depressed angle of about 60 degrees, with a green light, both indicating "all right," "line clear," or "proceed."

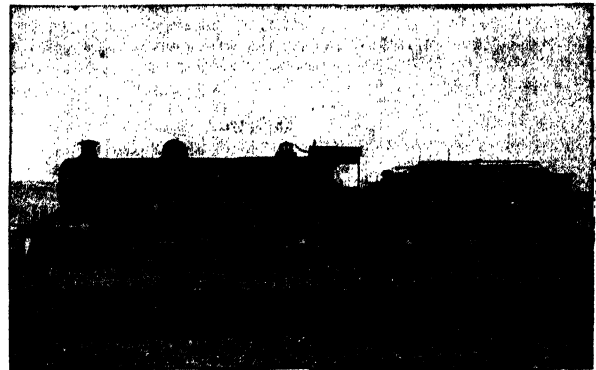
(d) *Stations.* Railway-stations are built at intervals along the line to serve the requirements of the neighbouring population. They may briefly be divided into passenger and goods stations. The smaller type of passenger station is generally furnished with ticket-office, waiting and retiring-rooms concentrated together on one side of the line and a small shelter on the other platform. The goods service is most conveniently performed



(1)



(2)



(3)

LOCOMOTIVE TYPES.

- (1) Great Western Express Engine.
- (2) North Eastern " "
- (3) Great Central " "

(Photos: Locomotive Publishing Company.)

when the loading and discharging shed is close to the main passenger buildings and so under the surveillance of the station-master. Stations of a larger type, such as those for junctions and small towns, have in many cases waiting-rooms for each class, refreshment-rooms and other conveniences. Overbridges on railways should be provided to enable passengers to cross from one platform to another. The goods station is frequently quite independent of the passenger in towns of moderate importance. It should be furnished with loading and discharging platforms, cranes, weighbridges and storeroom. It should always, if possible, be built on the same side of the line as the large factories, mills and workshops, many of which will require to be served with their own rails. Stations of the largest sort have, of course, more complete installations still and the goods service is quite distinct. In the United Kingdom it is always customary to provide a raised platform, nearly three feet high, but on the Continent, where passengers are confined to the waiting-rooms until a few minutes before the train starts, the platforms are rarely higher than six inches. At the largest centres depôts for housing, coaling, watering and repairing of locomotives, etc., are established. They should adjoin the passenger and goods stations, but be kept quite distinct from them. Water-tanks, coal-shoots, ash-pits and turn-tables are also necessary. Difference of opinion seems to exist as to whether a rectangular or circular building is more economical. Some of the largest locomotive depôts in England are those at Crewe, Derby and Swindon, in Scotland at Glasgow (where the construction of locomotives is a leading industry) and in the United States at Altoona.

(c) *Locomotives, Carriages and Waggon.* Since the days of George Stephenson's famous *Rocket* the locomotive has, of all the factors going to form a railway, undergone perhaps the least change. It consists now, as then, of a fire-box in which combustion takes place; of a boiler filled with water surrounding tubes through which the heated gases given off by combustion in the fire-box flow, heating the water on their way and converting it into steam; of a pair of cylinders (or in compound engines three or perhaps four cylinders), to which the steam is conducted from the boiler by suitable pipes; of a piston-head, moving steam-tight in this cylinder and attached to a piston-rod, which, connected by cranks to the axle of the driving-wheels, revolves these latter; and of eccentrics, which are so fixed to the axle and connected with the valve-motion that steam is admitted as desired to the cylinders. These are the main features of almost all locomotives; minor details, of course, vary in particular cases, but not to any great extent. There are, for instance, bar frames and plate-frames, Wootton and Belpaire fireboxes, etc. But although there is great similarity in the main points of locomotive construction, there is considerable variation in size and weight. In the old days single-driver locomotives were largely used; but, as trains grew heavier and faster, it was found that adhesion was insufficient and accordingly the load on the driving wheel was increased until it was as heavy as the

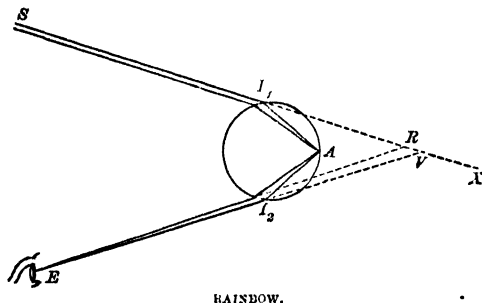
permanent way would bear. Then, in order to distribute weight, four-coupled engines were introduced and these are now, with driving wheels about 6½ to 7 feet in diameter, used almost solely for passenger train working. For goods traffic six-coupled locomotives with wheels about 5 feet in diameter give the best results and for heavy trains on severe grades eight- and even ten-coupled types are employed. Suburban traffic is generally worked by tank engines, which carry their water at the side of the boiler and their coal in a small bunker behind and thus dispense with a tender. Main-line locomotives weigh more than 70 tons, including tender. Carriages and waggons form a considerable part of the rolling stock of a railway. The former are constructed on the compartment system in the United Kingdom and on the Continent generally; but in America, where there is virtually only one class, the vehicles are open throughout. Each method has its advantages, the balance being probably rather in favour of the American style. In the United Kingdom and the United States passenger carriages are much more comfortably upholstered than on the continent of Europe, internal dimensions are also larger and there is more window space and greater cleanliness in the carriages of the lowest (or third) class. Some attention, however, remains to be paid to heating and lighting. Besides the ordinary passenger rolling stock, special vehicles for dining, sleeping, etc., are provided at somewhat higher charges. These vehicles are generally mounted on bogie trucks and are decorated and upholstered (especially in the United States) at considerable cost. The dining-cars, which are general on the great trunk lines, proved extremely acceptable to the travelling public, although their dead weight was at least double that of the ordinary vehicles which they superseded. Railway waggons should be constructed as strongly as possible, in order to resist shocks in shunting operations. They may be divided into covered waggons and open waggons, the former being generally used for valuable goods, meat, etc. Besides the ordinary types used for conveying merchandise and minerals, special vehicles have been constructed for the conveyance of fish, frozen meat, oils, tar, and heavy guns, as well as for the railway postal sorting office.

(f) *Statistics of Mileage.* The following table gives some idea of the importance of railway interests and railway traffic in six of the leading countries of the world:—

Country.	Length in Miles.	Inhabitants per Mile of Railway.
Austria-Hungary - -	23,800	1,907
France - - - - -	24,580	1,585
Germany - - - - -	34,309	1,643
Great Britain and Ireland - - - - -	22,634	1,766
Russia - - - - -	40,507	3,559
United States - - -	212,349	358

Rain, the moisture of the air condensed into drops too large to float in the air as cloud or mist. It generally originates in clouds, the upper part of which, being more free from dust motes than the lower, forms larger drops. Whatever tends to lower the temperature of the air below the dew-point is a cause of rain. Thus when the wind blows over a wide ocean, the rainfall is large; when the wind blows from warmer into colder regions, the rainfall is large; and when the wind blows over a mountain range, the rainfall is high on the windward and low on the leeward side of the range.

Rainbow is caused by the refraction which rays of light undergo when the sun is shining on drops of water. These drops of water may be in the form of rain, or may be artificially produced, as in spray from a fountain. Imagine a beam of light falling upon a spherical rain-drop and after refraction and reflection entering an observer's eye. It is apparent that for some position of the drop with regard to the sun and the observer the ray will, after reflection, from the inside surface of the drop, have a path symmetrical with the one before such reflection. Let SI_1 be such a beam from the sun incident on the drop at I_1 , it will be refracted in the direction of I_1A , reflected at A in the direction AI_2 and at I_2 suffer a second refraction in the direction I_2E . In this case the ray has undergone the minimum deviation, and it is by means of such rays that the observer sees the bow. The different elementary colours are, however, refracted differently; the violet rays will deviate most from their incident direction and the red least; EV and ER may repre-



sent the directions in which the observer sees these colours in the sky. If SI_1 be produced to cut ER and EV , the deviation XVE of the violet rays is greater than the deviation XRE of the red when X is any point beyond V on SI_1 produced. Hence the observer would see in the sky a narrow strip of colour due to this one drop and the red colour will be above the violet. A number of drops will give rise to a number of such strips which unite to form the coloured bow. Sometimes a secondary bow is seen outside the primary and in this case the violet is above the red; this is formed by the rays which undergo two reflections inside the drop. It is seldom that more than two rainbows are seen at a time, since the luminosity decreases with each successive

reflection; the primary is always by far the most brilliant.

Rainfall, the amount of rain that falls at a particular spot or over a certain area in a given time. It is generally stated in inches, being collected in a rain-gauge and allowance being made for evaporation. It is usual to take an average of the total falls each year for a term of years, but a more accurate conception of atmospheric moisture will be obtained if this average is supplemented by a record of the average number of rainy days or by monthly averages. Most of England has an annual rainfall of less than 40 inches, Huntingdonshire having only about 21 inches; but at Senthwaite, in Cumberland, the average is 146 inches. Most of Ireland has more than 40 inches but no part more than 76 inches; whilst in Scotland the highest average is 128. The highest recorded annual average in the world is 493 inches at Chirrapunji, on the Khasi Hills, in Lower Bengal. On five successive days 30 inches each day has been recorded at this station, whilst 7 inches is the highest on record for one day in Great Britain.

Rain-Gauge, an instrument for measuring rainfall, consisting generally of a circular funnel, of known diameter, which leads to a receiver. If the diameter be 4.697 inches, each fluid ounce of rain collected represents one-tenth of an inch, since the area will be 17.33 square inches and a fluid ounce at ordinary temperature is 1.733 cubic inches. Glaisher's gauge, recommended by the Royal Meteorological Society, is a copper cylinder 8 inches across and 18 inches high, with the funnel about half-way down, so as to allow for snow. The mouth of the funnel should be one foot from the surface of the ground, as, from wind and other causes, the amount registered varies at different heights.

Rainy, ROBERT, theologian, was born at Glasgow, Scotland, on January 1st, 1826, and was educated at the High School and University of Glasgow. He studied theology at New College, Edinburgh, and in 1851 was appointed minister of the Free Church of Huntly, in Aberdeenshire, from which he was transferred, three years later, to the Free High Church, Edinburgh. This charge he vacated in 1862, when he became Professor of Church History in New College, of which institution he was elected Principal in 1874. The latter office he held till his death, but he retired from the chair in 1900. The foremost advocate of the union of the Free and United Presbyterian Churches of Scotland, it was largely owing to his statesmanship that this consummation was effected in 1900. When, however, by the irony of events, delicate questions of Presbyterian theology were settled adversely to the United Free Church by the House of Lords, sitting as a court of appeal, a tribunal mostly composed of Anglican lawyers, Principal Rainy and his colleagues were in 1904 excluded from their posts and the church buildings in favour of the "Wee Frees," the remnant of the foundation Church of the

Disruption (1843). He was author of *The Life of Principal Cunningham* (1871), *The Delivery and Development of Christian Doctrine* (the Cunningham Lecture, 1874), *The Bible and Criticism* (1878), *The Epistle to the Philippians* (1892), and *The Ancient Catholic Church* (1901). Though politically a sympathiser with progress, in theology he was conservative, if not retrograde, and moved the resolution by which Dr. Robertson Smith, the well-known Hebraist, was removed from the Professorship of Theology at New College. Nevertheless Rainy was a tower of strength in the Free Church, of the Assembly of which he was Moderator in 1887. It was in fitting recognition of his labours on behalf of union that he was chosen, in 1900, the first Moderator of the United Free Church of Scotland. He died in Melbourne, Australia, on December 22nd, 1906.

Raised Beaches are ledges on cliffs or near the sea, but at some height above its present level, covered with shingle and sand, often with sea-shells and sometimes with sea-caves behind them. Their raised position is generally taken as evidence of the land having risen since their formation. On the coast of Chile this has been brought about at various successive periods by violent earthquake action; but elsewhere, as on the coast of Scotland and Norway, the movement seems to have been more gradual. Some geologists, however, explain such raised sea-beaches on the assumption that the land has remained rigid while the ice of the Glacial Period raised the sea-level by attraction. Raised beaches left by the shrinkage of evaporation surround the Great Salt Lake and the Dead Sea and the parallel roads at Glen Roy in Scotland and at other places are similar evidences that in geological times inland lakes or seas existed where now are valley and dry land.

Raisins, dried grapes, generally sun-dried, mentioned in early books of the Bible. Some are dipped in potash-lye or in olive-oil to give them a gloss. The seedless varieties are known as sultanias. Most raisins come from Malaga, Valencia and Alicante, the finest being known as Malaga clusters, which, as well as Malaga layers, are a muscatel grape. Smyrna raisins, of which the best are *Eleme*, are less imported; but all sultanias come from this district. It is curious that it seems to be only the grapes of a certain Mediterranean belt that are available for raisins, no variety of American grape having yet been found adapted to this treatment. Raisins dried in the sun are obviously superior to those cured in heated chambers.

Raja, or **RAJAH** (Hindustani *rāja*, from Sanskrit *rājā* [*rāja-rājan*], "a king," "a prince," "a chief"), a prince of Hindu blood ruling a province, or other area, either independently or as a feudatory. Their power is virtually subordinate to that of the British residents at their courts. The few who are still endowed with some of the attributes of sovereignty are usually called Maharajas ("great rajas"). Formerly British rule in India was concisely described as "the British raj."

Raj-Bhansi (i.e., "sons of kings"), the title assumed by numerous Hinduised aborigines of Kutch-Bihar, Bengal, who claim to be Aryans of the Kshatriya (warrior) caste, but who are really a branch of the Koch race dominant in the Lower Ganges basin before the arrival of the Aryans; the genealogies of the local "rajas" showing Aryan descent are all fabrications. In Assam there is an agricultural caste specially known as Raj-Bhansi, who are also of Koch descent, and who number about 110,000.

Raj-Gond, a main branch of the Dravidian Gonds, of the Central Provinces, India, who claim royal descent (whence their title of "Royal Gonds"), and consider themselves to be akin to the Rajputs. They are numerous, especially in the province of Nagpore, where they form two main divisions: Raj-Gond proper and Ravan-bhansi with twenty-seven subdivisions.

Raj-Mahali, Dravidian people of the Rajmahal Hills, north of Chota Nagpore, between Upper and Lower Bengal. They call themselves Mali ("Men"), and speak an uncultivated but distinct Dravidian dialect of archaic type.

Rajputana, a territory in the north-west of India, comprising several Native States, bounded on the N. by the Punjab, on the E. by the United Provinces of Agra and Oudh, on the S.E. by Central India and on the S.W. and W. by Bombay. It occupies an area of 128,980 square miles. In the heart of the region lies the British province of Ajmere-Merwara. The Native States composing Rajputana are Alwar (3,141 square miles; pop. 828,487), Bharatpur (1,982 sq. m.; pop. 626,665), Bikaner (23,311 sq. m.; pop. 504,627), Bundi (2,220 sq. m.; pop. 171,227), Dholpur (1,155 sq. m.; pop. 270,973), Jaipur (15,579 sq. m.; pop. 2,658,666), Jaisalmer (16,062 sq. m.; pop. 73,370), Jodhpur (34,963 sq. m.; pop. 1,935,565), Karauli (1,242 sq. m.; pop. 156,786), Kota (6,684 sq. m.; pop. 544,879), Tonk (2,553 sq. m.; pop. 273,201) and Mewar (12,753 sq. m.; pop. 1,018,805). It is traversed by the Aravalli range, north of which lie sandy deserts, whilst the smaller portion to the south-east contains many fertile valleys and uplands. The Luni, Chambal and Banas are the chief rivers and the only natural lake of importance is the salt lake of Sambhar, in Jaipur. Cereals, cotton, pulse, hemp and flax are the chief products, but camels, horses and sheep are bred in considerable numbers. There are few industries save metal-work, ivory-carving and salt-drying. Cobalt, copper, iron, alum and zinc are worked in parts and the supply of building stone is plentiful. Banking and money-lending flourish especially among the Merwaris. The climate is hot, the rainfall slight and the area is periodically scourged by famine. Jaipur (160,167) is the principal town. Pop. (1901), 9,841,765, mostly Hindus, with a small proportion (one-tenth) Mohammedans.

Rajputs ("sons of kings"), one of the great divisions of the Indian Aryans who give their name to the region of Rajputana, in North-West India,

where they have been settled from remote times, but, as would seem, subsequently to the first Aryan invasions. Although claiming to be high-caste, i.e., full-blood Hindus of the Kshatrya (warrior) class, the claim is disallowed by the Brahmins and there can be no doubt that they had already contracted alliances with the Jats, Bhils and other aborigines before the institution of caste. The purity of the race, however, appears to have been preserved in many of the noble families and especially in that of the Udaipur dynasty, whose headship is recognised by all the Rajputs. The regular features and light complexion, especially of the women of high birth, show that the original stock was undoubtedly Caucasian and most probably of Aryan speech. But it is equally certain that the Rajputs were preceded in their present domain by other Caucasians and Aryans and especially by the Jats, with whom they contracted alliances in prehistoric times. In North-West India the pure and mixed Rajputs are divided into endless tribal groups or classes (Sherring in *Hindu Tribes and Castes* gives an incomplete list of six hundred), with a population of some 9,000,000 in Rajputana alone and many more in Punjab and the North-West Provinces. They are distinguished by their warlike character and highly chivalrous sentiment towards the women, despite the former universal prevalence of female infanticide and suttee. Sir W. W. Hunter says that they are most punctilious on points of etiquette, while "the tradition of common ancestry has preserved among them the feeling which permits a poor Rajput yeoman to hold himself as good a gentleman as the most powerful landholder." Their marriage customs are rigidly exogamous, that is to say, each clan depends on the other clans for its wives, for Rajput will only mate with Rajput. With few exceptions the Rajputs are Hindus by religion and those of Rajputana speak a pure Hindi dialect developed in the 12th century specially under the influence of the great poem *Chand Bardai*.

Rakhaingtha, the aborigines of Arakan, to which province of Burma they give their name (*Arakan* is a corrupt form of *Rakhaing*). They are a primitive branch of the Burmese family, and hence in their chronicles are called M'rammakrih, i.e., "great" or "elder Burmese." Their speech is a rude and archaic form of Burmese, written with a modified form of the Burmese alphabet. Their religion is Buddhism, except amongst the Mrus, Shendus and some other hill tribes, who are still Nature-worshippers.

Rakoczy, FRANCIS, II., patriot, born in the castle of Bors, Hungary, March 27th, 1676, was grandson of George Rakoczy II. (1615-60), prince of Transylvania, who died of wounds he received at the battle of Klausenburg when fighting the Turks in defence of his throne and country. His son, Francis Rakoczy I. (1642-76), was involved in the Palatine Wesselenyi's conspiracy and his life was only spared through the intervention of his mother at the cost of an immense ransom. Francis Rakoczy II., at the age of twelve, and his sister,

were taken from their mother by the Austrians. He was educated in Vienna and grew to manhood subject to many indignities. After his marriage with a princess of Hesse, he retired to one of his estates in Northern Hungary which had been restored to him, intending to live peaceably as a country magnate. But when he witnessed the wrongs done to his nation he realised that he, the descendant of a line of heroes, was regarded as their natural leader. In 1703, with the help of the French king, he headed a new insurrection to recover the liberties of his people, hoisting his flag with the inscription *Pro Patria et Libertate*. His followers overran the country. The Austrians endeavoured to make peace, but nothing less than independence would satisfy the insurgents. In 1707 the dynasty of Hapsburg was dethroned and Rakoczy elected Prince of Transylvania, the independence of Hungary being proclaimed on May 31st. From that time the fortunes of Hungary declined and the rebels were speedily subdued. Rakoczy, refusing offers of pardon, in despair retired to Poland and eventually peace was concluded, in 1711, at Szatmar, by Alexander Karolyi, chief of the Hungarian generals, who was rewarded with many of the Rakoczy estates. Rakoczy was then banished by his compatriots and went to France, where he was hospitably received by Louis XIV., who gave him 600,000 francs and a pension of 6,000 francs monthly. Hoping the Turks, his stepfather Tököly's old friends, would lend him troops to raise another rebellion against Austria, Rakoczy went to Turkey, but his expectations were disappointed, and he died in exile at Rodosto, on the shore of the Sea of Marmora, on April 8th, 1735. That he fought against the Austrians seems to be his greatest title to becoming Hungary's national hero and the descendants of Karolyi are among the most active of those who champion the cause of the Magyar Fatherland. Francis Joseph, the Emperor of Austria-Hungary, having sanctioned the repeal of the law of banishment of 1715, and the rights of the Karolyi family to the patriot's property being protected, on October 29th, 1906, amid popular rejoicings and imposing ceremonies, the bones of Rakoczy were brought to Budapest and deposited in the cathedral. The Hungarian national air, known as "Rakoczy's March," was composed by one of his followers, a gipsy named Michael Barna, in 1705. Liszt wrote an orchestral version of it and Berlioz introduced it into his *Damnation de Faust*.

Raleigh, capital of North Carolina, United States, 115 miles N.W. of Wilmington. It occupies high ground and was built around a wooded area, now called Union Square, the old trees of which, preserved by the first settlers, gave the town the title of the City of Oaks. The principal buildings are the Capitol, a fine granite domed structure, the United States Court House, the North Carolina College of the Agricultural and Mechanical Arts, Shaw University (for coloured students), Peace Institute, the Baptist Female Institute and the Geological Museum. The industries are chiefly concerned with cotton and tobacco, but there are

also iron-foundries, railway works, car factories and hosiery mills. Pop. (1900), 13,843.

Raleigh, or RALEGH, SIR WALTER, discoverer and historian, was born about 1552 at Hayes, near Budleigh Salterton, Devonshire. He probably attended schools in Budleigh, Sidmouth and Ottery St. Mary and was also entered at Oriel College, Oxford. In his seventeenth year he became one of the volunteer troop which was then sent into France and served with the Huguenots for about five years,



SIR WALTER RALEIGH.

(From the portrait by Zuccheri.)

afterwards going to the Netherlands, where he also won distinction as a soldier. In 1578 he accompanied his half-brother, Humphrey Gilbert, in a colonising expedition to North America, but returned within a year, the project proving something of a fiasco. We next find him in Ireland, where his bravery and success in crushing the rebellions of the south procured him the appointment to the Governorship of Cork and the supreme command in Munster. Here he met Edmund Spenser, the poet, who had written some of his *Faerie Queene*, which Raleigh admired so much that he induced its author to go to London and publish it, which was accordingly done. In Munster, Raleigh acted with severity, but was not peculiar in that respect. About 1582 he returned to England, where he was received at Court, the Queen being charmed by his gallant bearing and fascinating manners. To this period belong the well-known, though somewhat doubtfully-authenticated, stories of his spreading his new plush cloak over a muddy path for Elizabeth to walk on and of his writing with a diamond

on a pane in the palace—"Fain would I climb, yet fear I to fall," and the Queen's answer similarly displayed—"If thy heart fails thee, climb not at all." He speedily became a favourite and was permitted an interest, though he did not take part, in a second expedition to North America with his half-brother and in this journey made many discoveries. He was knighted in 1584, in which year he also equipped another of several expeditions to North America, all fruitful in discovery, though he was not personally engaged in any of them and never set foot in Virginia in his life. To the territory discovered in 1584 the Queen gave the name of Virginia, where a colony was founded in 1585, though it lapsed afterwards. In 1586 the potato and tobacco were introduced into England and if, as has been asserted, Raleigh also planted potatoes in his garden at Youghal he is entitled to be regarded as one of the foremost benefactors of Ireland. When the Armada threatened England Raleigh took a prominent part in organising the defensive measures (1588). But he did not share in the fighting nor in the expeditions against the Spanish shipping sent out in 1591 and 1592. Appointed a gentleman of the privy chamber, he fell into disgrace (1592) through his attachment to the daughter of Sir Nicholas Throgmorton. He was imprisoned for a time in the Tower, but married the lady of his choice, who was one of the Queen's maids of honour. His next notable exploit was the help he rendered in the discovery of Guiana (1595). His history of the *Discoverie of Guiana* (1596) is excellent and was much esteemed by his contemporaries for its style. Besides his reputation as a courtier and soldier, he had slowly acquired fame as a writer and was a good deal more than a minor poet. In 1596 he was one of those instrumental in the capture of Cadiz and soon afterwards was re-established in the Queen's favour. He was made ambassador to Flanders in 1600 and was offered the viceroyalty of Ireland, which he refused. His enemies induced James I. to believe that he was conspiring to remove him from the throne. He was degraded, tried at Winchester (1603) and sentenced to death. The sentence being commuted, he was imprisoned in the Tower of London for more than twelve years, during which he wrote his admirable *History of the World*, published in 1614. He was released in 1616, and soon afterwards was engaged in the disastrous expedition to the Orinoco, where he and his men came into conflict with the Spaniards, then at peace with Great Britain. Being repulsed, the expedition returned and reached Plymouth in June, 1618. He was arrested and condemned to death under his former sentence, which the commissioners appointed to consider his case held not to have been discharged by his release. He met his fate calmly, being beheaded in Old Palace Yard, Westminster, on October 29th, 1618. To one who objected that he ought to lay his head on the block pointing eastwards he gave the noble answer, "What matter how the head lie, so the heart be right?" Ben Jonson, perhaps not unjustly, described him as esteeming glory more than conscience, but that was not so much a personal failing as a characteristic of the age.

Ramadan, the ninth month of the Moslem year and the period of the Mohammedan Lent or yearly thirty days' fast. It was rigorously observed daily throughout the month from sunrise to sunset, when many restrictions were removed till dawn. Fanaticism is so greatly inflamed during this period that, as a general rule, unbelievers avoid at least the more remote Moslem districts in which the Christian's life would be in permanent danger. The fast, however, is said to be losing something of its former stringency. The fast terminates in the three days' feast called the Lesser Bairam.

Ramayana (Sanskrit), the title of Valmiki's great epic poem in Sanskrit, containing 24,000 verses in seven books or Kandas. The main theme is the expedition of Rama (the chief incarnation of the Hindu god Vishnu) through the Deccan to Ceylon to recover, by the aid of the monkey-god Hanuman, his wife Sita, who was carried away by Ravana. This and the *Mahabharata* are the two great epic poems of ancient India.

Rambouillet, MARQUISE DE (CATHERINE DE VIVONNE), was born in Rome in 1588, her father being French ambassador there and her mother a member of one of its aristocratic families. She was married at the age of twelve years to Charles d'Angennes, who, on his father's death in 1611, became Marquis de Rambouillet. They went to Paris, where the society of the Court was not at all to her taste. She initiated the idea of forming a society of her own and, being a lover of the arts and of literature, rich and hospitable, she soon gathered into her *salons* all that was best and most intellectual in Paris. French literature of that time is full of references to her and her circle, which, however, finally succumbed to its preciosities, being dissolved at her death on December 2nd, 1665. One of their affectations was the adoption of *sobriquets*. The Marquise herself was "Arthénice," Sarasin "Sesostris," Chapelain "Chrysante" and Mdlle. de Scudéry "Sarraïde." The most notable men in France were members of her *coterie*.

Rameau, JEAN PHILIPPE, composer, was born at Dijon, France, on September 25th, 1683. His father designed him for the law, but he had early manifested a strong liking for music which indeed absorbed him throughout his life. After many vicissitudes he published his *Traité de l'Harmonie* in 1722. His first signal success, as a composer, came with his opera of *Hippolyte et Aricie*, produced in 1733. This was followed by a large number of similar works, among which may be mentioned *Les Indes galantes* (1735), *Castor et Pollux*, his masterpiece (1737), *Les Fêtes d'Hébé* (1739), *Dardanus* (1739), *La Princesse de Navarre* (1745). In 1750 he published his *Démonstration du principe de l'Harmonie*. Five years earlier the king had named him composer of his chamber music and in his later years his countrymen made ample recognition of his great genius. He wrote much for the organ and harpsichord, besides dance and occasional music. He died in Paris on September 12th, 1764.

Rameses or Ramses II., King of Egypt, the Pharaoh of the Oppression, whose name is recorded

on many monuments as that of a great conqueror though he was the builder of them, lived 1,400 years before the Christian era and reigned 67 years. He was a pitiless king and the Egyptians left his tomb unfinished in token, it is said, of their resentment. His son and successor Merenptah was the Pharaoh of the Exodus.



RAMESES II.

Ramillies, a village of Brabant, Belgium, 19 miles S.S.E. of Louvain. Here, on May 23rd, 1706, the Duke of Marlborough defeated the French under Marshal Villeroy. The victory was very popular in England and several articles of dress were named after it. The Ramilie hat was a cocked hat worn in the reign of George I., and the Ramilie wig, with a long gradually diminishing tail which carried a very large bow at the top and a smaller one at the bottom, was in fashion till the time of George III.

Rammohun, Roy, an Indian philosopher, who was discarded by his family for his attack upon some of the tenets of the Brahmin religion, was born at Radhanagar, Bengal, in 1772. He received a good education and was versed in Persian, Arabic and Sanskrit. At the age of 15 he went to Tibet to study Buddhism and returned with his faith in idol-worship shattered. About 1813 he published a protest against superstition and priestcraft and retired to Calcutta for safety. He studied the religions of other nations, learnt English and became a warm adherent of British power. He translated the Vedas into English and, though not a Christian, adopted what he believed the best part of that and other religions. He strongly denounced the horrible Hindu practice of suttee, or the sacrifice of widows, and incurred the resentment of the populace. After years of thought and preparation he founded, on January 23rd, 1830, the Brahmo-Somaj, a monotheistic religion, of which the cardinal doctrine is the universal presence of the Divine Spirit, pervading all Nature and inspiring all that are willing to receive Him. In the same year Rammohun was sent to England by the King of Delhi as an ambassador, and died at Bristol on September 27th, 1833.

Rampion, or RAMP (a corruption of the Latin *rapunculus*, a diminutive of *rapa*, "a turnip"), the old English name for a species of Campanula (*C. Rapunculus*) which, with allied forms, is still cultivated in France and Italy for the sake of its white roots, which are sometimes used in salads. The name is also applied to the genus *Phyteuma*, allied to the Campanulas. It is rare in Great Britain, but extremely common in the Alps.

Ramsay, ALLAN, poet, was born at Leadhills, Lanarkshire, Scotland, on October 15th, 1686, his father, Robert Ramsay, being manager of Lord Hopetoun's lead mines on Crawford Moor. Apprenticed to an Edinburgh wig-maker in 1701 (shaving was at that time a separate craft), in 1712 he started in business for himself in the High Street and by his prudence soon became a substantial citizen. In the same year he married Christian Ross and joined the Jacobite "Easy Club," entertaining its convivial members with his earliest verse and afterwards being made their laureate. Though describing himself as a skull-thatcher, he was honourably proud of his descent from the family of Dalhousie and also called himself "a poet sprung from a Douglas loin." His poems, issued in penny sheets, became popular and he abandoned wig-making for bookselling, setting up the sign of Mercury over his old shop. His first writings were satirical and humorous, his most ambitious work being a continuation of King James I.'s *Chrysts Kirke on the Greene*. In 1725 his best work, a pastoral play, *The Gentle Shepherd*, appeared and was immediately successful. The action is slow, but its appreciation of natural beauty, of rural customs and character, compensates for its artificial plot. The following year Ramsay removed to the Lucken-booths, farther up High Street, where he started the first circulating library in Scotland. In 1743 he built an octagonal house on the Castle rock, called by the wags his "goose-pie," where he died on January 7th, 1755. The correspondent of Pope and of Gay; the welcome guest of the foremost people of Edinburgh; the sweet singer of "The Yellow-haired Laddie" and the pathetic "Lochaber no more"; an epistolary poet imitated by Robert Burns, his anthologies, such as *The Tea-table Miscellany* (1724-40) and *The Evergreen* (1724), preserved many old Scots songs and poems, and saving Burns, Sir Walter Scott and the Ettrick Shepherd, no Scottish poet is more widely known than "honest Allan."

Ramsay, ALLAN, painter, only surviving son of the foregoing, was born in Edinburgh in 1713. He went to London when he was twenty and became a student at St. Martin's Lane Academy. He set up as a portrait-painter on his return home and in 1736 started on a prolonged tour through France to Rome, where he studied diligently. After three years in Italy he again returned to Edinburgh, resuming portrait-painting and in 1754 founded the "Select Society," a debating society among whose members David Hume, Principal Robertson and Adam Smith were chief. On his removal to London he rivalled Sir Joshua Reynolds in popular favour. In 1767 he was appointed painter to George III., whose fondness for presenting portraits of himself and the queen made Ramsay busy and prosperous. The friend of Johnson, who thought highly of him, a man of literary capacity, a linguist and traveller, he died, on his way back from Italy, at Dover in 1784.

Ramsay, SIR ANDREW CROMBIE, geologist, was born at Glasgow on January 31st, 1814, and educated at Saltcoats and Glasgow High School.

He was placed as a lad with a cotton broker, but having taken up geology as a hobby he came to know Sir Roderick Impey Murchison, through whose means he was employed on the Geological Survey. He held the chair of Geology in University College, London, from 1847 till 1852, when he became lecturer in Geology at the School of Mines, also retaining his connection with the Survey. On the death of Murchison in 1871 he was appointed Director-General of the Geological Survey, and, on his retirement, ten years later, received the honour of knighthood. He had been elected F.R.S. in 1862. He was the author of *Physical Geology and Geography of Great Britain* (1853) and numerous valuable scientific papers. As a geologist his greatest services were rendered in the branch of stratigraphy. He died at Beaumaris, Wales, on December 9th, 1891.

Ramsay, EDWARD BANNERMAN, Dean of Edinburgh, was born at Aberdeen, on January 31st, 1793, and educated at Durham and St. John's College, Cambridge. He took holy orders and, after



EDWARD BANNERMAN RAMSAY.

(Photo : J. Ross.)

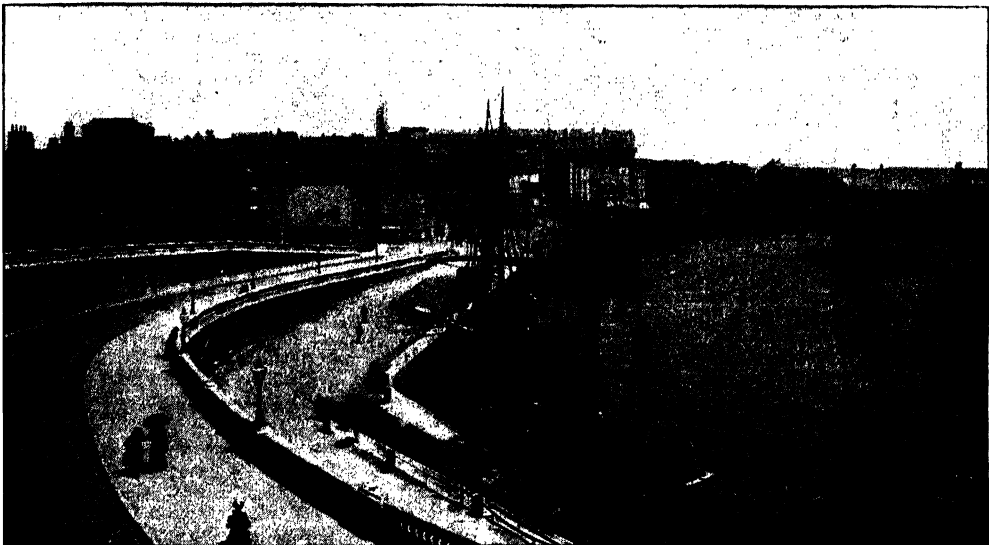
filling several curacies, was appointed, in 1824, curate of St. George's, York-place, Edinburgh. Three years later he became assistant to Bishop Sandford, of St. John's, in the same city and succeeded him in the pastorate in 1830. In 1841 he was appointed Dean of Edinburgh, a post which suited him admirably, and which the offer of episcopal preferment did not tempt him to vacate. He died in Edinburgh on December 27th, 1872. He was a man of tolerant views, and to his advocacy was largely due the removal of the barriers which divided the Scots Episcopal Church from the Church of England. Popularly Ramsay is best known by his famous *Reminiscences of Scottish Life and Character*.

Ramsbottom, a town of Lancashire, England, on the Irwell, 13½ miles N. of Manchester. There is a memorial window to Lord Palmerston in St. Paul's Church. It is singular that the Public Library, opened in 1838, was closed after just upon fifty years' existence (1887). The manufactures include cottons, calicoes, ropes and machinery, besides iron- and brass-founding. Sir Robert Peel, the great statesman's father, established calico printing here. Pop. (1901), 15,920.

Ramsden, JESSE, optician and mathematical instrument maker, was born at Salterhebble, a suburb of Halifax, Yorkshire, on October 6th, 1735. After serving his time to the cloth working, he was apprenticed (1758) to the making of mathematical instruments, and in 1762 started on his own account, marrying a few years later a daughter of John Dollond, the optician. His instruments at once became in universal request, among his greatest successes being the movement for a heliostat, which enabled Von Zach to follow Sirius for twelve hours, a pyrometer for measuring expansion through heat, a dynamometer for ascertaining telescopic powers, a 5-foot vertical circle for Palermo Observatory, the zenith-sector constructed for the measurement of the British Arc (which perished in the fire in the Tower of London in 1841) and the theodolite, 4 feet in diameter, carrying telescopes of 3-feet focus for General William Ray's Survey. He was elected F.R.S. in 1786 and received the Copley Medal in 1795 for his inventions and improvements in philosophical instruments. He died at Brighton, November 5th, 1800. After explaining a new device to a workman his favourite formula was, "Now, see, man, let us try to find fault with it."

copy of Erasmus's *Paraphrase of the Gospels*. Other prominent buildings are the Grammar School, the Institute (containing a School of Art) and the Abbey Rooms. There are two main streets—one, the Great Whyte, running north and south; the other, the High Street, crossing it at the southern end at right angles. Pop. (1901), 4,823.

Ramsey, a seaport and watering-place on the north-east coast of the Isle of Man, England, 13 miles N.N.E. of Douglas. The mouth of the Sulby, which intersects the town, expands to form a commodious harbour. The old town lies to the south of the harbour, the northern quarter, known as the Morragh, constituting the fashionable resort. An arm of the Sulby has been converted into a lake, on one side of which is laid out Morragh Park. The marine promenade on the eastern border of the lake is nearly a mile long. The fisheries are the main industry, the harbour on the return of the fleet presenting an animated appearance. There is communication by steamer with the Clyde, Liverpool, Whitehaven and Douglas. Ramsey Bay extends from Point of Ayre to Maughold Head, a distance of 9 miles. Pop. (1901), 4,730.



RAMSGATE HARBOUR.

[Photo: Chester Vaughan, Acton, W.]

Ramsey, a town of Huntingdonshire, England, on Burybrook, a tributary of the Nen, 10 miles N.E. of Huntingdon. The fine Perpendicular gatehouse and refectory are the sole remains of the mitred Benedictine Abbey which was founded in 969, and which, surrounded by the river and marshes, was accessible only by boats. In the Norman and Early English Church of St. Thomas à Becket (restored in 1844) are preserved a chained copy of Dean Comber's *On the Book of Common Prayer* and a black-letter

Ramsgate, a port and seaside resort in the Isle of Thanet and county of Kent, England, 65 miles E. by S. of London, and 4 miles S. of Margate. When George IV. embarked here in 1821 for Hanover and landed again at the same spot on his return, he decreed that the town should henceforth be known as "Royal." The obelisk hard by commemorates the occasion. The public buildings include St. Augustine's Church, by some considered the masterpiece of Augustus Welby Pugin; St. George's

Church, the fine tower of which is the mariners' landmark; the Jewish Synagogue, erected in 1833 by Sir Moses Montefiore, and the adjoining mausoleum—a copy of Rachel's Tomb in Palestine—in which he and his wife repose, the town hall and the Granville Hotel designed by E. W. Pugin. The harbour was chosen in 1749 as the harbour of refuge for the Downs and has since then undergone most extensive alterations. It has wet and dry docks and is protected by two fine piers. The scene on the sands in August is unique in South England and has been rendered familiar by the picture by W. P. Frith, R.A. At high tide the children are closely packed together and ministered to by an army of caterers. Ellington Park, in the upper part of the town, is finely wooded and picturesque. Pegwell Bay to the south, the subject of an admired painting by William Dyce, R.A., is famous for its shrimps which are largely potted. Ramsgate, with a southern aspect, has a considerable winter season. The fisheries and the shipping trade provide the chief industries, apart from its custom as a holiday and health resort. POP. (1901), 27,773.

Ramus, PETER, otherwise PIERRE DE LA RAMÉE, philosopher, was born at Cuth in the Vermandois, France, about 1515. He was in his youth a servant at the College of Navarre and, being of a studious turn, managed to acquire much learning and eventually became a notable scholar. He wrote voluminously and in 1545 published a work against Aristotle's teachings which caused a sensation. It was suppressed and its author prevented from teaching, but Henri II. restored him to his profession and named him royal professor of rhetoric and philosophy. He wrote a great number of books and his knowledge of languages was very great. He became a Protestant, however, and was twice obliged to leave Paris and on August 24th, 1572, was one of the victims of the massacre of St. Bartholomew. He was the best mathematician of his time in France and translated Euclid. He was also an excellent orator and grammarian and wrote various grammatical treatises. He it was who caused the introduction of the letters *j* and *v* into the European languages in place of the ancient *i* and *u*, which had hitherto done double duty.

Ranch, a large herding or farming establishment in the western states of America or in Central or South America, especially a large stock-farm managed by a mess (Spanish, *rancha*) of herders, the cattle-run being termed a range. At least once a year a "round-up," or stock-taking, is held, which provides the rancheros with their one great episode of annual excitement. Though settlement and railways encroach upon the ranch lands, ranching will long continue to fascinate those young men for whom uneventful, if possibly more useful, careers in towns have no attraction. It has also been proved that, despite its hardships, the free open-air life in such a State as Colorado, for example, is extremely beneficial not only in averting phthisis, but also in building up a permanently strong constitution. A cultivated farm or plantation is known as a *hacienda*.

Rand, THE, an abbreviated form of WITWATERS-RAND, an elevated range in the south-west of the Transvaal, South Africa, with a general east-and-west direction. Its conglomerate banket (reef or outcrop) forms one of the richest gold areas in the world. Its exploitation began in 1885 and furnished, more or less directly, the cause of the Boer War. Johannesburg, at a height of 5,689 feet above the sea and with a population of 160,000, is the centre of the goldfields.

Randolph, THOMAS, poet, was born at Newnham-cum-Badby, near Daventry, Northamptonshire, in 1605 and was educated at Westminster School and Trinity College, Cambridge. While an undergraduate he came to London to make the acquaintance of Ben Jonson and met him at the Devil tavern, near Temple Bar. After taking his degree in 1628, though he still continued to reside in Cambridge, his trips to London grew more frequent and he fell into dissipated habits. His first publication was *Aristippus, or the Joviall Philosopher* (1630), a prose and verse skit on University education and a monologue called *The Conceited Pedler*. In 1632 his comedy of *The Jealous Lovers* was acted at Cambridge before Charles I. and Henrietta Maria. But his wild life had ruined his constitution and an attack of smallpox carried him off at Blatherwick, Northamptonshire, in March, 1635. His volume of *Poems, with the Musers' Looking Glasse and Anyntas* appeared posthumously (1638).

Ranelagh, a celebrated resort of the gay and fashionable world of London during the last half of the eighteenth century, occupied the grounds of Ranelagh House, Chelsea. It consisted of a rotunda with an orchestra in the middle surrounded by boxes, while there was an outside gallery supported on a piazza which afforded a space for the promenaders. Music and dancing were the chief attractions. The gardens were opened in 1742 and closed in 1803. Its area is now partly occupied by the gardens of Chelsea Hospital. Vauxhall, the rival establishment on the opposite or Surrey side of the river, survived till 1859. The Ranelagh mob, or cap, was named from a head-dress worn in the 18th century by women at Ranelagh, a fashionable resort near Dublin.

Rangoon, the capital of Burma, on the left bank of the Hlaing or Rangoon, a branch of the Irrawaddy, 21 miles from the sea. Since 1880 the district of Rangoon has been limited to the area of 22 square miles, in which the town is included. The river harbour is accessible to ships of large draught and a large trade is carried on, the exports being teak, rice, cotton, hides, petroleum, catechu, shellac and tobacco and the imports consisting of all kinds of European manufactures. Ship-building employs many hands and there are also sawmills, oil-mills and rice-mills, besides manufactures of textiles. The principal buildings include many Buddhist monasteries, of which the Shwe Dagon Pagoda is the most remarkable, Government House, the Law Courts, the Court House, Payre Museum, the Town Hall, the Assembly Rooms, Rangoon College, Rangoon Baptist College and the Roman

Catholic and Anglican Cathedrals. The Royal Lake (160 acres) and the well-wooded Dalhousie Park constitute a magnificent recreation ground. Rangoon was founded in 1753, taken by the British in 1824 and finally annexed in 1852. Pop. (1901), 234,881.

Ranke, LEOPOLD VON, historian, was born at Wiehe, Thuringia, on December 21st, 1795, and studied at the University of Leipzig. In 1817 he became professor of history at Frankfurt-on-the-Oder. His first notable work was his *History of the Roman and Teuton Nations* (1824) and this gained him a professorship in Berlin. In 1827 he published a still more important work, *History of the Princes and Peoples of Southern Europe in the 16th and 17th Centuries*. Obtaining leave of absence for a time, he made many researches in great Italian and other libraries for his best-known work, the *History of the Popes*, which appeared in 1834-7. This has been often translated, but his greatest effort is considered to be his *History of Germany during the Reformation* (1839-47). In 1841 he was made royal historiographer and devoted himself more sedulously than ever to research. His *Twelve Books of Prussian History* (1847-8), said to have gained for him from Carlyle the nickname of "Dr. Dryasdust," was followed, among other learned works, by the *History of France in the 16th and 17th Centuries*, the *History of England in the 16th and 17th Centuries* (1859-67), monographs on Wallenstein, Hardenberg, Frederick the Great and Frederick William IV. and a *History of the World* which was not completed when death overtook him at Berlin on May 23rd, 1886. He was essentially a student, not a man of action. Though he passed through the stirring times of the German newbirth consequent on the masterful insolence of Napoleon and the revolutionary epoch of 1848, both periods left him untouched. But this aloofness was not carried into the lecture-room and doubtless it helped to make him the foremost of German historians.

Ransom, through French *rançon* and Latin *redemptio*, the price demanded or paid for the deliverance of captive or slave, or for the recovery of captured goods; the consideration for which punishment is remitted or restraint removed. In the New Testament the word is used in reference to Christ's gift of Himself for the redemption of man. The older commentators, construing the text literally, held that His death was a ransom paid to Satan. Modern theologians consider either that the receiver was an impersonal power or condition, such as death, sin and evil, or the overmastering necessity which dictated the course of events; or else they find the question of no special interest or importance. Others, viewing ransom as a propitiation offered in satisfaction for a life, argue that God was the recipient of the ransom, tendered on behalf of those who were unable to provide it for themselves.

Ranunculaceæ, an order of thalamifloral dicotyledons comprising about 500 species in about 30 genera. With the exception of *Clematis* they are herbs, with radical or scattered leaves and flowers specially characterised by the absence of

any cohesion or adhesion among their parts. These flowers are often monosymmetric, being nearly always nectariferous and insect-fertilised. They are pentamerous; but the petals are frequently absent or aborted, the stamens are indefinite in number and the carpels may be one, two, three, five, or indefinite. The sepals are imbricate and deciduous, the petals and stamens hypogynous and the seeds albuminous. The fruit is apocarpous and generally dry, consisting either of achenes or follicles. Almost all members of the order have acrid properties and they belong mainly to temperate and cold regions. Among the genera are *Clematis*, *Anemone*, *Ranunculus*, from which the order takes its name and which includes the buttercup, *Caltha*, the marsh-marigold, *Helleborus*, including the Christmas rose, *Aquilegia*, the columbines, *Delphinium*, the larkspurs, *Aconitum* and *Pæonia*. Most of the species contain in their colourless juice a bitter caustic principle which is a dangerous poison, though medicinally of very considerable value.

Ranz des Vaches, one of the melodies or airs played by the Swiss herdsmen on the Alpine horn, when driving the cattle to pasture or calling them home. The melodies vary in different cantons and are sometimes sung. They consist of irregular phrases made up of the harmonic tones of the horn, which are extremely effective in the mountain air and mingling with the echoes. Swiss hearing the melodies in foreign lands are sometimes overcome with homesickness. It is doubtful whether *ranz* comes from the German *ranzen*, "to make a noise," or is a variant plural of *rang*, a row or rank. In the one case the words would mean "the lowing of the kine," in the other "the line of cows," in allusion to the fact that the cattle fall into line when they hear the Alpine horn. The melody most favoured in Appenzel has been familiar in England since the time of Queen Anne and was finely introduced by Rossini into his opera of *Guillaume Tell*. Grétry, Meyerbeer and other composers have also employed it.

Rape, the general name for several races of *Brassica campestris*, cultivated for the sake of the oil in their seeds and differing by constant characters from turnips or swedes. It is very extensively cultivated in India and Russia. In Germany three sub-races are recognised, each with summer and winter, or annual and biennial, varieties, differing in the colour of their radical leaves and in the size and colour of their seeds. These are colza, with ruddy brown seeds, 1,000 of which weigh 29 grains; rübsen, with almost black seeds, 1,000 of which weigh 34 grains; and rape, with blue-black seeds twice as heavy as those of rübsen. The seeds yield from 30 to 45 per cent. of a sherry-coloured oil, with a specific gravity over .911, consisting of olein, stearin and a third fat, almost peculiar to Crucifereæ. Rape-oil is used for food in India and Germany, but elsewhere mainly for lubrication, mineral oils having largely superseded it as illuminants.

Raphael Santi (otherwise RAFFAELLO SANZIO), painter, was born at Urbino, Italy, in

1483, being the son of a painter named Giovanni Santi, who, before his death in 1494, taught him the elements of his art. Raphael was left a small inheritance and about 1495 (though some writers put it at a much later date) began to take lessons in the studio of Perugino in Perugia. There is much controversy about his earliest works, the influence of various masters discernible in them having led many to the opinion that he studied under several. But it is agreed that after 1504 he began an independent career and, except for an occasional trace of the manner of Leonardo da Vinci and Michael Angelo, his pictures henceforth showed more and more of his sweet and gracious individuality. In the year just mentioned he went to Florence and in the following year was back



ST. CATHERINE.

(By Raphael Santi, in the National Gallery, London.)

again in Perugia. He began to obtain some noteworthy commissions, and in 1507 finished his "Entombment" and worked at several fine frescoes. He moved frequently between Perugia and Florence and in or about 1509 proceeded to Rome to decorate certain apartments in the Vatican to the order of Julius II. Here he did some of his grandest work and commissions poured in upon him to such an extent that he was obliged to leave the execution of many of them to his pupils, who worked from his designs. The accession of Leo X. increased his commissions from the Vatican, for which some of his most beautiful work was done. For it he did the magnificent cartoons illustrating the "Acts of the Apostles," ten in number, seven of which are now in the Victoria and Albert Museum in London, the other three having perished. One of his wealthiest patrons was Agostino Chigi, for whose villa at Trastevere Raphael completed various works. Besides his paintings and cartoons, Raphael is supposed to have been the architect of some splendid

edifices, notably the Palazzo Pandolfini, and was appointed chief architect and inspector of antiquities at St. Peter's, where certain improvements have been attributed to him, but there is much doubt as to the extent of his architectural achievements. He never married, but was engaged to the niece of Cardinal Bibbiena, her early death preventing the nuptials. There is very little doubt but that Maria Bibbiena died of a broken heart, for after his betrothal to her Raphael had met Margherita—"La Fornarina"—the lovely daughter of a baker living in the Trastevere, a district of Rome near the Janiculum, on the right bank of the Tiber. Rodolfo Lanciani, who investigated the question of the relationship between the painter and his beautiful model, says, in his exhaustive and scholarly review of *The Golden Days of the Renaissance in Rome* (London: Constable), that, during the nine years preceding his death, "Raphael repaid the love of Margherita with immortality. He reproduced her likeness in the fresco of 'Heliodorus,' in the 'Madonna di San Sisto,' in the 'Transfiguration,' in the 'Parnassus under the attributes of Clio.'" He painted the charming portrait of her in the Pitti Gallery, and yet Lanciani considers it tolerably certain that in his last hours, under the influence of the Church and moved by a deathbed repentance for the wrong done to Maria Bibbiena, Raphael allowed the weeping Margherita to be driven away, leaving her only a modest competence. The fate of the Fornarina was until 1897 a matter of conjecture, but Antonio Valeri then ascertained, after careful research, that, when turned out of the house in the Piazza del Pantheon, Margherita fell into a stupor, from which she was aroused only by the determination to pass the rest of her days as a recluse. With the help of Cardinal Bibbiena she was received into the congregation of Sant' Apollonia, near the church of Santi Margherita ed Emidio in Trastevere. Raphael died of fever at Rome on Good Friday, April 6th, 1520, and lay in state with his unfinished masterpiece "The Transfiguration" at the head of his bier. He was buried in the Pantheon. The civilised world has unanimously accepted Raphael as one of the greatest, if not the very greatest, of all painters. Fortunately many of his most splendid works have found their way to other lands than Italy, which possesses enough and to spare. In the National Gallery, London, there are the "Madonna Ansdei" (secured for the nation for £70,000), "The Vision of a Knight" and "St. Catherine." In the Louvre are "La Belle Jardinière," "St. Michael," "St. George" and the portrait of Count Baldassare Castiglione. But Dresden holds his masterpiece, the "Sistine Madonna," a work of ineffable beauty.

Raphia, a strong and useful fibre obtained from the leaves of *Raphia Ruffia*, a palm cultivated in Madagascar, Mauritius and neighbouring islands and of *R. tedigera*, the Jupati palm, of Brazil. It comes into the market in strips $\frac{1}{4}$ to $\frac{3}{8}$ inch wide and was mainly introduced as a substitute for Russian bast at the time of the Crimean War. The trees grow in low swampy lands and banks near tidal limits. Their trunks are unarmed and comparatively short, but their spiny leaves are from 20

to 30 feet long and may sometimes reach the enormous length of 50 feet.

Raphides, a Greek word meaning "needles," applied strictly, in botany, to the slender crystals of calcium oxalate, belonging to the Oblique system, which occur in bundles chiefly in the cells of monocotyledons. The term is, however, often extended to any crystals occurring within the plant, those grouped in spherical clusters being distinguished as spheraphides.

Rapin de Thoyras, PAUL, historian, was born at Castres, department of Tarn, France, in 1661. The son of an advocate, he became a student of law, but was driven from France by the revocation of the Edict of Nantes (1685) and spent some years in England and Holland. He followed William III. to Ireland and fought at the battle of the Boyne and at Limerick, where he was seriously wounded. He was appointed tutor to the youth who afterwards became 1st Duke of Portland and travelled with him in Germany, France and Italy. Retiring to Wesel in 1707, there he wrote his notable *History of England*, which appeared in eight volumes in 1724 at The Hague. This work has much merit and is still of considerable value to students. It begins with the landing of the Romans and Rapin's text ended with the accession of William III. It was continued to the death of William III. by David Durand. Rapin died at Wesel on May 16th, 1725.

Rapp, GEORGE. [NEW HARMONY.]

Rapp, JEAN, COUNT DE, general, was born at Colmar, Alsace, on April 26th, 1772. Intended for the Church, he joined the army in 1788 and served with great distinction during the revolutionary wars, showing signal valour in Germany and Egypt. Napoleon had a high opinion of his merits and made him successively general of brigade, general of division and count. From 1807 to 1809 he was Governor of Danzig. He took part in the battle of Essling and afterwards in the fateful campaign in Russia. From January, 1813, to January, 1814, he sustained at Danzig one of the most memorable of sieges. After a brief imprisonment in Russia he returned to France and received from Louis XVIII. the Cross of St. Louis and a command. Compromised, however, by the Hundred Days, he withdrew to the Swiss canton of Aargau. Being pardoned in 1817 he was named a peer of France and died at Rheinweiler in Baden on November 8th, 1821. His intrepidity was proverbial and he was amiable and gentle in private life, but possessed marked sagacity and firmness.

Rash. Certain febrile disorders are attended by characteristic cutaneous eruptions or rashes. These maladies are known as the exanthemata (small-pox, chicken-pox, scarlet fever, measles, typhoid and typhus fevers). The term rash is sometimes applied to other forms of skin eruption, as, for example, nettle-rash and the rashes which are produced by the administration of certain drugs.

Rashi, SOLOMON BAR ISAAC, Rabbinical writer, was born at Troyes, France, in 1040. He was taught at Worms and Mayence and returned to his native town in 1065, where he followed the calling of a rabbi, but was mostly dependent for a livelihood on his vineyards and wine-making. About 1070 he opened a school, which became the most notable in Northern France. His bent towards theology led him to study the Talmudic writings and his comments upon them are held in great repute and even reverence by Jews. As an interpreter of the Talmud he had no equal. He wrote much, among his writings being a *Commentary on the Pentateuch* (which was printed at Reggio, in 1475, and was the first book ever printed in Hebrew), but his *Notes on the Talmud* (1520) constitutes his chief work. His commentaries on the different books ultimately constituted a Commentary on the whole of the Old Testament. He died at Troyes on July 13th, 1105.

Rask, RASMUS CHRISTIAN, philologist, was born near Odense, in the island of Fünen, Denmark, on November 22nd, 1787. Though his parents were very poor, he was enabled to attend Copenhagen University. He made a special study of the Northern languages and urged the importance of Icelandic literature. In 1816 he went on a tour in the East and studied its languages, returning in 1823. In 1829 he was appointed professor of Oriental languages at Copenhagen. He had a most accurate and extensive knowledge of English and produced in 1817 the first good Anglo-Saxon grammar. He published grammars of other languages also and demonstrated the affinity between the Scandinavian and Latin, Greek and Slavonic languages. He died at Copenhagen on November 14th, 1832.

Raspail, FRANÇOIS VINCENT, chemist and revolutionary, was born at Carpentras, department of Vaucluse, France, on January 29th, 1794. He was educated at Avignon and became teacher of classics in his native town. He went to Paris in 1816 and kept himself by tutoring. His ardent Republicanism brought him into constant collision with the authorities and he was repeatedly imprisoned. Meanwhile he had taken up chemistry and botany, which he studied with enthusiasm. His declaration during the trial of Lafarge (1840) that he could find arsenic even in the wood of the President's chair created a great sensation. In 1843 he introduced the use of camphor as an antiseptic, having traced disease to the presence of bacteria. Although he was mistaken in regarding camphor treatment as a universal panacea, it is perhaps not extravagant to regard him as a precursor of Pasteur. In trouble again in 1848, he was sentenced to six years' imprisonment, went to Belgium in 1855, returned to France under amnesty in 1859 and was elected deputy for the Rhône in 1869. Once more imprisoned, on his release he was elected deputy for Marseilles in 1876, and died at Arcueil, near Paris, on January 7th, 1878. Among his many works were *Nouveau Système de chimie organique* (1833), *Système nouveau de physiologie végétale et*

de botanique (1836), *Manuel Annuaire de Santé* (1843), *Histoire Naturelle de la Santé et de la Maladie chez les végétaux et les animaux* (1843) and *Almanach et calendrier météorologique* (1865).

Raspberry (*Rubus Idæus*), a deciduous shrub belonging to the Rosaceæ, with biennial erect stems, known to gardeners as "canes," round and bristly; pinnate leaves, whitish beneath; white flowers; a persistent calyx; conical receptacle; and an etario of red, amber, or white hoary drupels. It is a native of Europe and Russia-in-Asia, its English name referring to the rough aspect of the fruit, and was cultivated by the Romans in the 4th century, since which period it has never lost its vogue. The fragrant fruit is largely used for dessert, tarts, jam, syrup, jolly and vinegar.

Rastadt, or RASTATT, a fortified town of Baden, on the Murg, three miles from its junction with the Rhine, 12 miles S.S.W. of Carlsruhe. Commanding the roads through the Black Forest, it possesses great strategical importance and has a large garrison. It has manufactures of tobacco, cooking-stoves, and lace. The old palace of the Margraves is the only building of interest. The treaty between France and Austria, ending the war of the Spanish Succession, was signed here in 1714. Rastadt was the last stronghold of the revolutionists in Baden in 1849. Pop. (1900), 13,910.

Rat, a name for the larger members of the Mouse family, sometimes used with an epithet to denote other animals, either allied to the true rats or in some way resembling them. There are two British species, the Old English or Black Rat (*Mus rattus*), with greyish or black fur on the upper surface, ashy beneath, the head and body being about seven inches long, and the tail a little more; and the Brown or Norway Rat (*Mus decumanus*)—the "Hanoverian" Rat of Waterton—greyish-brown above, whitish beneath, head and body about nine inches long, tail seven inches or a little more. In both forms the tail is scaly; the Norway Rat has the head less elongated and a blunter muzzle and smaller ears than the Black Rat. The former was introduced into England—probably from the East Indies—early in the 18th century and has not only almost entirely displaced the Black Rat in that country, but has been successful in finding a footing all over the globe. The epithet "Norway" is a mistaken one; when it was first applied, the animal was not even known to exist in that country. Black varieties occur, but are readily distinguished from the true Black Rat by the shape of the head. The Black Rat seems not to have been known in Great Britain before the middle of the 16th century. In habits it agrees with the larger form, but is not so fierce, and the white and pied rats kept as pets are generally varieties of this species. The habits of rats are well known. They are nocturnal burrowing animals, extremely active and predaceous, feeding on whatever comes in their way and destroying any obstacle that bars their progress. In the *Field* of March 3rd, 1894, was given an illustration of some lead water-pipes

through which rats had eaten their way. Stories are told of their attacking fat pigs and when short of food they have been known to eat away horses' hoofs, while their instinct at times amounts almost to sagacity. They are extremely prolific; they breed at about six months old, producing four or five litters, of from four to ten young ones in each, in the year. The raptorial birds keep down their numbers in some degree, but traps and poison are also largely used. Waterton claimed to have rid his house of "Hanoverian" rats by covering with tar one he had caught in a trap and then turning it loose.

Batafia, OIL OF, an essential oil employed for flavouring purposes, which enters into the composition of the liqueur of the same name. The flavour is frequently derived from bitter almonds, black currants and the kernels of cherries and peaches.

Ratel, a small bear-like Carnivore from India and South Africa. The Cape Ratel (*Mellivora capensis*), sometimes called the Honey Badger, grey above and black beneath—the line of demarcation being so sharp that the animal looks as if it were really black, but wore a grey cloak—is about the size of a badger. It feeds principally on bees and honey and shows great ingenuity in tracking to their nest the insects which it sees on the wing. Sparrmann says that it seats itself on a hillock to look about for bees, shading its eyes the while with a fore paw from the rays of the setting sun. It is very sleepy during the day, is tenacious of life, being protected from attack by its thick loose skin and subcutaneous layer of fat, and possesses a weapon of defence and possibly offence in the strong pungent secretion of its tail glands. It is a fine burrower, being able to dig a hole and disappear into it in remarkably little time. The Indian species (*M. indica*), which Blanford considers doubtfully distinct, is said to disinter and feed on dead bodies. Both forms are easily tamed and their habit of tumbling head over heels in captivity is very amusing.

Ratibor, a town of Silesia, Prussia, on the Oder, 44 miles S.S.E. of Oppeln and 13 miles from the Austrian frontier. The chief buildings are the handsome courthouse and the fine old castle of the Dukes of Ratibor. Its manufactures are varied, including ironware, furniture, tobacco, paper, sugar, glass, machinery and chemicals, while hemp and vegetables are extensively cultivated in the vicinity. Pop. (1900), 25,236.

Ratio is the relation between two quantities of the same kind. The ratio between A and B is generally written A : B, A being termed the antecedent and B the consequent term. The value of the ratio is obtained when it is found what multiple or part the one term is of the other. Since this can be found by dividing one by the other, the ratio A : B can also be written $\frac{A}{B}$. Hence any ratio can be expressed as a fraction. Since

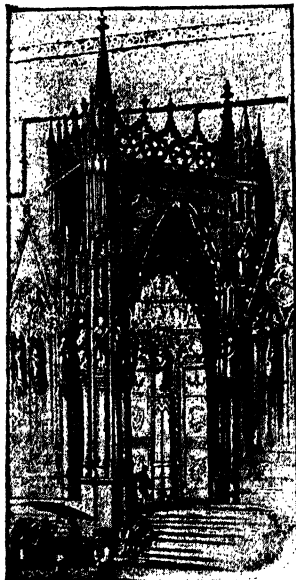
$\frac{A}{B} = \frac{\rho_A}{\rho_B}$, we can state that the value of any ratio is unaltered if antecedent and consequent be multiplied by the same quantity.

Ration, a computed share or allowance of provisions for daily consumption issued to each officer and man, or of forage for each horse, by the commissariat department of the army or navy. The quantity and quality differ considerably in different countries.

Rationalism, the principle of believing nothing which is not logically or scientifically demonstrable to human reason; the rejection of all mysteries, miracles and authoritative dogmas as such; or in other words, the denial of the validity and merit of the faith of dogmatic theology. In a wide sense it refuses to accept *ex cathedra* declarations; more strictly, it subjects doctrines, whatever they may be, which are held of faith, to the antecedent scrutiny and sanction of reason and is thus opposed both to mysticism and sectarian creed.

Ratisbon (German, **REGENSBURG**), a city of Bavaria and capital of the Upper Palatinate, on

the right bank of the Danube, opposite the mouth of the Regen, 53 miles S.E. of Nuremberg. As a Celtic settlement it existed before Roman times, was erected into a bishopric in the 8th century and became a free imperial city about 1200. A period of great commercial prosperity followed, but this had died out before the Thirty Years' War, in which it suffered severely. It was annexed by Bavaria in 1810. Imperial Diets were frequently held here and the Ambassadors' Street still contains



PORCH OF RATISBON CATHEDRAL.

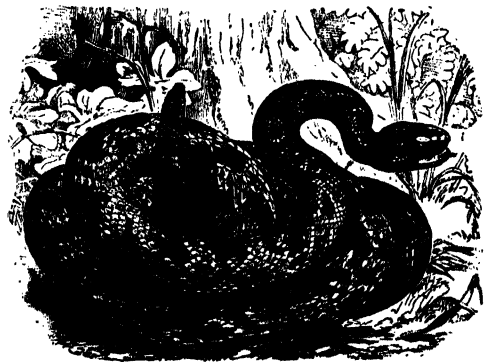
the houses of representatives. The cathedral, founded in 1275, is a fine example of pure Gothic style and the Schottenkirche, dating from the 12th century, is a curious Romanesque building. There are other picturesque churches, such as the Early Gothic Dominican, St. Ulrich's Church, the abbey church of Obermünster and the venerable Benedictine Abbey of St. Emmeran. Buildings interesting on various grounds are the King of Bavaria's

superb villa, the Town Hall, the inn of the Golden Cross in which Charles V. lodged, the public library and picture gallery. The principal manufactures are iron and steel goods, pencils, pottery, soap, machinery, bookbinding, printing and parquet floors. There is a considerable trade in local produce and boat-building flourishes. A few miles east of Ratisbon, on the left bank of the Danube, conspicuously placed on a wooded height, stands Walhalla, the German temple of Fame, erected in 1830-41 by Louis I. of Bavaria. It is built of marble on the model of the Parthenon and contains statues, busts and other sculptures illustrative of the heroes of the Fatherland. Pop. (1900), 45,426.

Rattan. [CALAMUS.]

Rattazzi, **URBANO**, statesman, was born at Alessandria, Piedmont, Italy, on June 29th, 1808. He studied law at first and afterwards became an advocate of note at Turin. After the 1848 revolution he entered the Chamber of Deputies as member for his birthplace and became successively Minister of Education, of Justice, Vice-President of the Chamber of Deputies and President (1852); was a member of Cavour's ministry and, after the latter's death, was again President of the Chamber. In 1862 and 1866 he was Prime Minister and was one of the most strenuous workers for the unification of Italy. He died at Frosinone, about 50 miles south-east of Rome, on June 5th, 1873, and was accorded the honour of a national burial at Alessandria.

Rattlesnake, a venomous snake belonging to the genus *Crotalus*, with about fifteen species, mostly North American, though one (*C. durissus*)



RATTLESNAKE.

ranges to Brazil. The tail bears a rattle of horny rings, erroneously said to indicate the age of the snake, its years being supposed to correspond to the number of the rings. New rings are probably added when the skin is cast, but in all probability sloughing takes place more than once a year, as in the common viper, or adder. The greatest number of rings is probably twenty-one. The one immediately adjoining the body appears to be "moulded"

on the last vertebra of the tail, from which it is separated by a layer of the true skin by which it is secreted. Rattlesnakes are generally nocturnal; they are extremely venomous, the bite generally proving fatal to man. They rarely attack unless provoked or in pursuit of food. It is a curious circumstance that they never strike unless coiled and that when thrown out of that position they may be approached without risk. The stories told of their powers of fascination are groundless; and the rattle seems to be used to warn off intruders rather than to entice prey or bring mates near. They were once common, but man, who is settling the land and encroaching on their domain, and hogs, their unrelenting enemy, have reduced their numbers noticeably. The coloration varies; it may be brownish, blackish, or yellow with dark spots, frequently bordered with yellow on the back and sides.

Rattray, a town of Perthshire, Scotland, on the Erich, about 15 miles N.N.E. of Perth. It is situated opposite to Blairgowrie, with which it communicates by bridge across the river. The soil is fertile and well suited for the growth of strawberries and other fruits. The chief manufactures are flax and jute. At Hatton Hill, from which Perth may be seen on a clear day, Donald Cargill, the martyred Covenanter, was born in 1619. Castlehill, an oblong mound to the south-east of the town, was so named because it contains traces of the ancient castle of Rattray. Pop. (1901), 2,462.

Rauch, CHRISTIAN DANIEL, sculptor, was born at Arulsen in Waldeck, Germany, on January 2nd, 1777. He



RAUCH'S STATUE OF FREDERICK THE GREAT IN BERLIN.

soon began to practise his art and, becoming a valet in the Royal Palace at Berlin (1797), his efforts attracted the notice of influential personages by whom he was sent to Rome (1804), where he was further befriended by Thorwaldsen, Canova and Wilhelm von Humboldt, the Prussian Minister. He soon proved his remarkable gifts and, in 1811, was

commissioned to execute the recumbent figure of Queen Louisa for her mausoleum at Charlottenburg. He also executed a still finer statue of her Majesty for the palace of Sans Souci. Henceforward he was never idle and it is computed that he was the author of more than 200 works, among which were statues of Scharnhorst, Blücher, Hardenberg, Maximilian of Bavaria (seated), Goethe and Frederick William III. His busts included those of Werner, Albrecht Dürer, Thorwaldsen and Schleiermacher, while the figures of "Faith," "Hope" and "Love," executed for his native town, were beautiful examples of his skill in purely fanciful subjects. His masterpiece is the equestrian statue of Frederick the Great, on a pedestal with a double row of reliefs—partly high and partly in full figure—which was erected in Berlin. Rauch died at Dresden on December 3rd, 1857.

Raumer, FRIEDRICH LUDWIG GEORG VON, historian, was born at Wörlitz, in Anhalt, Germany, on May 14th, 1781, and studied at Halle and Göttingen. In 1811 he became professor of history at Breslau and in 1818 was appointed to the chair of Political Science at Berlin, a post which he held till 1853. In 1848 he was elected to the short-lived Parliament of Frankfurt, which deputed him to represent it at Paris. His most notable works are *The History of the Hohenstaufen and their Times* (1823-5) and *History of Europe* (1832-50), but he wrote many others of merit. He was also the first editor of Brockhaus's *Yearbook of History (Historisches Taschenbuch)*, started in 1830. He died in Berlin on June 14th, 1873.

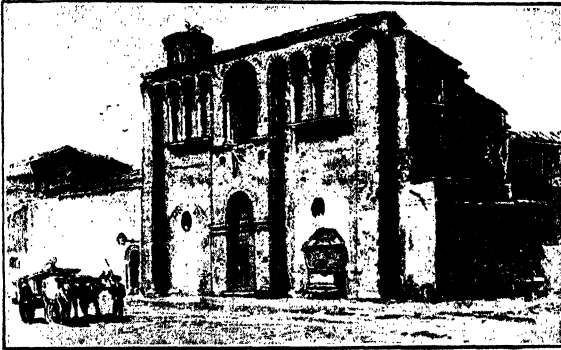
Rauschbrand, SYMPTOMATIC ANTHRAX, a disease of cattle in which swelling, often affecting one of the hind quarters ("black quarter" or "quarter evil"), occurs. The disease is due to a bacillus which presents some resemblance to the bacillus of anthrax; it is, however, usually motile and it can only be cultivated in the absence of oxygen.

Ravelin, in fortifications, a triangular work with two embankments forming a salient, projecting angle. A passage below the main moat of the fortress gives access from the stronghold to the ravelin, which is also protected by its own ditch and provided with a redoubt.

Raven (*Corvus corax*), a bird of the Crow family, widely distributed in the northern hemisphere in both the Old and the New World, but becoming rare in Great Britain. Excepting the Snow Bunting, it is the most northerly of the Perching birds, having been observed by Captain Fielden, in Sir George Nares's Arctic expedition, as far north as Cape Lupton in 81° 44' in the month of July. The total length is about two feet and the black plumage is in some parts varied with purple. The bill and legs are black. They still breed in some places along the south coast of England, but are more plentiful in the north. In a few cases they are protected in parks. They are useful birds in so far as they prey upon rats, but they attack feathered and furred game and even lambs, so that gamekeepers and farmers combine to destroy them. The Raven plays an important part in folk-lore, being regarded as a bird of evil omen, its croak

foreboding illness and death. In Scandinavian mythology it was looked upon as Odin's bird. It is the first bird mentioned by name in the Old Testament. It was sent out of the ark by Noah, but did not return.

Ravenna, the capital of the province of the same name, compartment of Emilia, Italy, about 5 miles from the shore of the Adriatic, with which it is connected by a canal, the rivers Ronco and Montone having silted up. Founded by Greeks,



RAVENNA: PALACE OF THEODORIC.

it was conquered by Rome about 191 B.C. Honorius transferred his court there in the 5th century and, on its capture by the Ostrogoths, Theodoric took up his abode in a vast palace the name of which still remains. After many vicissitudes it became an independent republic in the 13th century, passing later into the power of the Popes and being incorporated with Italy in 1859. There are many churches of supreme interest, including the cathedral, St. Vitale, St. Francesco, St. Apollinare Nuovo, St. Apollinare in Classe and Sta. Maria Maggiore, which date from the 4th to the 6th century. The Roman Porta Aurea, the tombs of Theodoric the Great (known as the Rotonda), Valentinian III., Dante, who died here in 1321, the pillar of Gaston de Foix, who fell after defeating the Spanish and Papal forces on April 11th, 1512, and the statues of the Popes in the market-place are among the many memorials of the past. Other important buildings are the archiepiscopal palace, the Academy of Fine Arts, the public library, the museum and the house which Byron occupied for two years (1819-21). The industries include wine-making, silk-spinning and weaving, printing, lace-making and the manufacture of agricultural implements, glass and musical instruments. Pop. (1901), 64,000.

Rawal, or RAWALPINDI, a division, district and capital town in the province of the Punjab, British India. The DIVISION has an area of 20,378 square miles and comprises the districts of Rawalpindi, Jhelum, Gujerat and Shahpur. Pop. (1901), 4,491,972. The DISTRICT, with an area of 4,844 square miles, lies on the slopes of the Himalaya

and consists of mountains divided by fertile valleys, along which torrents run down to the Indus and Jhelum. Agriculture is the only industry, save cotton-weaving, and the country is poor. Pop. (1901), 780,080. The CAPITAL, standing on both banks of the Leh, half-way between the Indus and the Jhelum, is a well-built, modern place and, being on the highway to Attock, Peshawar and Kabul, has some military importance and does a large transit trade, especially in grain. Pop. (1901), 87,688.

Rawlinson, GEORGE, theologian and historian, son of Abram Tyzack Rawlinson, was born at Chadlington, Oxfordshire, on November 23rd, 1812. Educated at Ealing School and Trinity College, Oxford, he became Fellow and tutor of Exeter College in 1840 and was ordained in 1841. Appointed Bampton lecturer in 1859 and Camden Professor of Ancient History, 1861-89, he was made Canon of Canterbury in 1872 and Proctor in Convocation for the Chapter of that Cathedral in the following year. Distinguished as a scholar and historian, his chief publications were his translation of the *History of Herodotus* (to which his brother Sir Henry Rawlinson and Sir Gardner Wilkinson contributed); several historical works on the ancient Eastern World; a *Memoir* of his brother, the distinguished soldier and Orientalist; and

his contributions to the *Speaker's Commentary* and Smith's *Dictionary of the Bible*. He died on October 6th, 1902.

Rawlinson, SIR HENRY CRESWICKE, Assyriologist, brother of the preceding, was born at Chadlington, Oxfordshire, on April 11th, 1810. He was educated at Wroughton and Ealing and entered the East India Company's service. Attached to the Bombay Army, he acquired a thorough military training and enjoyed many opportunities of cultivating his linguistic skill. For several years after 1833 he was employed in Persia, but with the completion of the Afghan war in 1843 his military career ended. In the year named he became political agent of the East India Company in Turkish Arabia and, in 1844, British Consul at Baghdad. These appointments enabled him to achieve the brilliant success of his life, namely, the deciphering of the cuneiform inscriptions of Darius Hystaspes on the rock-face at Behistun near Kermanshah. He resigned his consulship in 1855, was made K.C.B. in 1856 and was elected M.P. for Reigate in 1858, retiring a few months later when he became one of the first members of the Council of India. This post he vacated to assume the duties of minister-plenipotentiary to Persia (1859), an office which he resigned within ten months. From 1865 to 1868 he sat for Frome, distinguishing himself as a Russophobe, and in 1868 was again appointed to the India Council, of which he continued to be a member till his death on March 5th, 1895. He received the G.C.B. in 1889 and was created a baronet in 1891.

Ray (*Istioidei*), a section of Plagiostomatous fishes, in most of which the body is depressed and forms, with the large pectoral fins, a nearly circular disc. The gills, always five in number, open on the under side of the body. They communicate with spiracles, which open on the head behind the eyes and supply the gills with water when the fish lies on the ground. Owing to the numerous foldings of the gill-surface, Monro estimates that the whole area of respiratory tissue is equal to the entire external surface of the human body. The auditory apparatus is well developed and the eyes are placed, at some distance from each other, on the top of the head and are directed sideways. Most of the Rays feed on small crustacea, for the mastication of which their flat teeth are well adapted.

Ray, JOHN, the father of natural history in England, was born at Black Notley, near Braintree, Essex, on November 29th, 1627, and was educated at Catharine Hall and Trinity College, Cambridge. For several years he held different posts in the University and took holy orders in 1660. Travels in various parts of England, Wales and Scotland gave him a keen interest in botany, and in 1662 he contemplated a work on the organic world, he taking the plants and his friend Francis Willughby (1635-72) the animals. He was elected F.R.S. in 1667 and in 1670 published anonymously his *Collection of English Proverbs* and also his *Catalogus Plantarum Anglicæ*. In 1682 appeared his systematic work, *Methodus Plantarum Nova* and, in 1686, the first and, in 1688, the second volume of his *chef d'œuvre*, the *Historia Plantarum*, the third volume of which came out in 1704. His synopsis *Methodica Stirpium Britannicarum* (1690) was the first systematic English flora and was followed by two of his most popular books, the *Wisdom of God manifested in the Works of the Creation* (1691) and *Miscellaneous Discourses concerning the Dissolution and Changes of the World* (1692). He died at Black Notley on January 17th, 1705. His name appears to have been Wray, but after 1670 he spelt it without the W on account of the difficulty of Latinising it. His services to natural history were of fundamental importance. He was described as "the Aristotle of England and the Linnaeus of his age."

Rayleigh, JOHN WILLIAM STRUTT, 3rd BARON RAYLEIGH, was born on November 12th, 1842, son of the 2nd baron, whom he succeeded in 1873. Educated at Trinity College, Cambridge, he graduated as Senior Wrangler in 1865 and won the First Smith's Prize. In 1871 he married Evelyn, sister of Mr. A. J. Balfour, and from 1879-84 was Cavendish Professor of Experimental Physics in the University of Cambridge, succeeding John Tyndall as Professor of Natural Philosophy at the Royal Institution, London, in 1888. By his mathematical and physical writings, distinguished for their accuracy and definiteness, Lord Rayleigh became known throughout Europe as one of the greatest of British physicists. His *Theory of Sound*, 1877-8, is esteemed a fine example of a scientific treatise. His remarkable discovery of argon resulted from a series of experiments undertaken in order to

determine the atomic weight of nitrogen. With a wide range of knowledge he has also taken a great interest in psychological research and he was one of the few eminent men admitted to the Order of Merit which was founded in connection with the coronation of Edward VII.

Raynouard, FRANÇOIS JUSTE MARIE, poet and philologist, was born at Brignolles, department of Var, France, on September 8th, 1761. He was called to the bar and took some interest in politics. Incarcerated by the Terror for his lukewarm views, he composed his tragedy of *Caton d'Utique* in jail (1794). His poem of *Socrate au temple d'Aglaure* (1802) was crowned by the Institute, and his tragedy of *Templiers*, performed at the Théâtre Français in 1805, by order of Napoleon, had a brilliant success. He was a member of the Academy, of which he became permanent secretary in 1817. Amongst those of his tragedies that were not acted were *Scipion*, *Charles I.*, *Jeanne d'Arc à Orléans*, *Don Carlos*, etc. In the latter part of his life he gave special study, as a loyal Provençal, to the Romance language and literature, publishing an elementary Romance Grammar (1816), original poems by the Troubadours (1816-21), *Des Troubadours et des Cours d'Amour* (1817), the philology of *Roman de la Rose* (1829), and a Romance Dictionary (1838-44). This last, an important work, was published posthumously. He died at Passy on October 17th, 1836.

Razor-Bill (*Alca torda*), called also the RAZOR-BILLED AUK, a sea-bird common on the North Atlantic coasts and on rocky headlands in Great Britain. The total length is about eighteen inches; the plumage black, with a greenish gloss above, pure white below. Henry Seebohm calls it "the dandy of the cliffs." The single egg, whitish with brown markings, is laid on the bare rock. The flesh and eggs are eaten.

Razor Shells, the popular name for the long razor-shaped bivalved shells which are common on sandy shores; they belong to the genus *Solen*. They are of world-wide distribution, excepting in the colder seas. They are powerful excavators, but reluctant to leave their burrows. It is possible, however, to catch them with a bent pin and they are said to afford good eating when cooked.

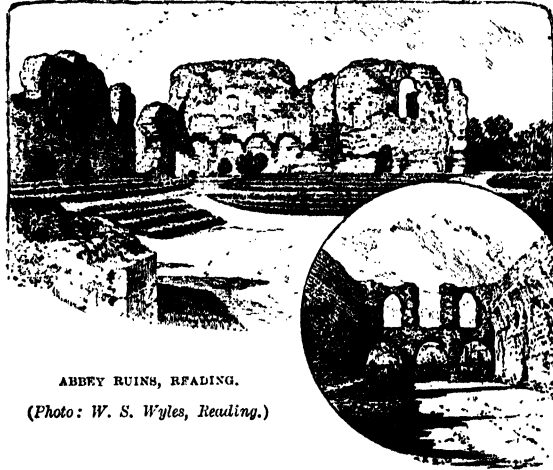
Ré, or RHÉ, ÎLE DE, in the Atlantic, 6 miles W. of La Rochelle, belonging to the department of Charente-Inferieure, France. The Pertuis Breton separates it from the coast of Vendée in the north, the Pertuis d'Antioche from the Île d'Oléron in the south, while the narrow but very deep Coureau de la Pallice divides it from the nearest point of the mainland. It is 18 miles long by four broad, and has rocky shores but good anchorages. St. Martin and Ars are the chief towns. Salt, wine, oysters, and fish are the chief products. It was long occupied by the English before 1457 and was attacked by them in 1627. It is now strongly fortified. Pop. (1901), 14,232.

Reade, CHARLES, novelist and dramatist, was born at Ipsden House, in Oxfordshire, on June 8th,

1814, and was educated privately and at Magdalen College, Oxford. He was called to the bar in 1843, but found in literature metal more attractive than in law. His few first efforts for the stage were not successful, but he made a hit with his brilliant comedy of *Masks and Faces* (1852), which he also converted into a novel as *Peg Woffington*. In 1853 appeared *Christie Johnstone*, a sympathetic story of Newhaven fisher life. Among other plays produced about this period was *The Courier of Lyons* (1854), which, re-named *The Lyons Mail*, held a firm place in the repertory of Sir Henry Irving. He published in 1856 *It is Never too late to Mend*, in which he exposed the abuses of prison discipline, his first novel with a purpose. A mediæval romance, *The Cloister and the Hearth*, his masterpiece, came out in 1861. *Hard Cash* (1863) exposed the cruelties of private lunatic asylums, and *Griffith Gawn* (1866) was believed by him to be his best work. He wrote *Foul Play* in conjunction with Dion Boucicault (1869), writing much for the stage meanwhile. Though he had the greatest faith in his power as a dramatist, his only truly successful plays were those already named and *Drink*, an adaptation of *L'Assommoir*, produced in 1879. He died in London on April 11th, 1884. He was a man of very strong opinions about literary property, and was generally at war with somebody or other, but he takes a place, if not in the highest rank, certainly among the greater English novelists.

Reading, the county town of Berkshire, England, on the right bank of the Thames at the point where it receives the Kennet, 36 miles W. of London. The Radvnges of Domesday Book, it has played a considerable part in history. Among sovereigns who have visited it were Stephen (1140), the Empress Maud (1141), Henry II., who, when Duke of Normandy, captured the castle in 1153, Edward II. (1314); Edward III., who had a grand tournament at Christmas, 1346; Richard II., who came in 1380 to punish the townsfolk who had supported Wat Tyler; Henry VII. (1487); Henry VIII. (frequently); Edward VI. (1552); Philip and Mary (1554) and Queen Elizabeth (several times). Parliament met here in 1191 (Richard I.), 1213 (John), 1241 (Henry III.), 1432 (adjourned from Westminster owing to the Plague), 1440, 1451 (Henry VI.). During another visitation of the Plague the Law Courts were temporarily removed from London in 1625. In the civil war Reading stood out for the King and the garrison had just surrendered in 1643, when Charles and Prince Rupert engaged the besiegers on Caversham Bridge, but were beaten. After the Restoration, as Charles II., with his Queen, passed through the town (1663) he received grants of money from the Corporation. In 1688 what was called "Reading Fight" took place between the Scottish and Irish adherents of James II.

and the forces of the Prince of Orange. The Dutchmen were victorious and the affair is still celebrated on December 21st by the ringing of the bells. The spacious Abbey, founded in 1121 by Henry I., is now in well-cared-for ruins, though the chapter-house is almost the only portion in fair condition. The principal churches are those of St. Lawrence, Early English with a Perpendicular tower; St. Giles, which was badly used by the Roundhead artillery; St. Mary, occupying the site of a convent founded by Elfrida and rebuilt in 1551 out of materials derived from the Abbey; Grey Friars, a reconstructed descendant of the ancient church of the Franciscan Monastery (1233), the west window of which is an unusually fine example of reticulated tracery; the Roman Catholic Church within the Abbey precincts and churches of various denominations, including a Friends' meeting-house. Secular structures comprise the handsome Municipal Buildings, consisting of the Town Hall, Council Chamber, School of Art, Free Library and Museum, rich in Roman remains from Silchester; Reading College (completed in 1906); the Grammar School, founded in 1486 by Henry VII. and reconstructed in 1871; the Assize Courts; the Corn Exchange; the Masonic Hall; the Athenæum and the Hospital. The Forbury, a pleasure garden adjoining the Abbey, contains (on a terra-cotta pedestal) a colossal iron lion, a memorial to the officers and men of the Berkshire Regiment who fell at Maiwand on July 27th, 1880, during the Afghan war. The town is a noted angling and boating centre and also possesses



ABBAY RUINS, READING.

(Photo: W. S. Wyles, Reading.)

a fine bowling-green and an extensive football ground. It is the headquarters of the biscuit and seed-growing trades, and other important industries are iron-founding, engine works, railway shops and brewing. Pop. (1901), 72,214.

Reading, the capital of Berks county, Pennsylvania, United States, finely situated on the Schuyl-

kill, 59 miles N.W. of Philadelphia. In the neighbouring hills, Mount Penn (1,040 feet) and Neversink Mountain (850 feet), it possesses thousands of acres of noble pleasure grounds. It is a great railway centre and the seat of the engine works of the Philadelphia and Reading Company. It has also extensive iron-works, cotton-mills, distilleries, breweries, tanneries, and paper-mills, and manufactures textiles, hosiery, fur hats, tobacco and glass, besides carrying on a large trade in coal. It is a healthy and well-built town, the population being largely German. Pop. (1900), 78,961.

Real (Latin, *regalis*, "royal"), a silver coin of Spain and some of her former American colonies. The *real de vellon* current in Spain is one-quarter of the peseta in value, or perhaps twopence in English money. The Mexican real, corresponding to the old Spanish *real de plata*, was nominally equal to one-eighth of a Mexican peso or dollar, but actually was worth threepence. It circulated in the United States till about 1850, being known in New York as the Spanish or Mexican shilling.

Real Estate. In England all property comes under one of two great divisions, namely, real and personal estate—"real" signifying freehold and "personal" chattel property (including leasehold estate, which passes by the legal designation of chattels real). The foundation for these terms is to be sought in the respective remedies resorted to for the deprivation of either. As to real estate, the land itself had to be recovered and as to personal estate, proceedings could be taken against the person only. In the olden days if, in an action for the recovery of his land, the wrongdoer would not give up possession, he could be turned out by the sheriff—the king's representative in the county. This kind of action was called "real" (Latin, *res*, "thing"), because the lawful owner recovered the actual thing for which the action was brought. But when a man was deprived wrongfully of his goods and chattels, his only remedy was to bring an action to compel the wrongdoer to pay him as compensation the value of the thing, that is, he did not recover the thing but a sum of money ("damages") payable by his adversary personally.

Realgar, a naturally-occurring sulphide of arsenic, represented chemically by the formula As_2S_3 . It occurs, frequently associated with lead, in the Harz mountains and other localities, forming fine orange- or ruby-coloured crystals belonging to the Rhombic system. It has a specific gravity of 3.5 and hardness 2. It is known also under the name of ruby sulphur, though the name is properly restricted to an artificial product of similar composition. It is employed as a pigment and also in pyrotechny for the production of white light, which is a mixture of 2 parts of ruby sulphur and 10 parts of nitre.

Realism, in philosophy, the metaphysical doctrine that universals really exist either apart from particulars, as Plato held, or that they are in particulars, as Aristotle held; or the combination of these views held by certain mediæval schoolmen. "Natural Realism," as held by Thomas Reid in

opposition to Bishop Berkeley, is the doctrine that the external world exists independently of perception and is directly, and not merely symbolically, knowable. Scientific realism regards genera and species as really existing relations between really existing objects, and also as concepts of such relations, so that the same name represents both the relations and the concept of the relations. [IDEA.] In literature and art realism, called also naturalism, is the theory that what actually exists and is actually true ought to be represented without any reticence and selection, which has in some cases induced nauseous delineation of what is vicious and revolting. This phase is a reaction against idealism and romanticism.

Ream (from the Arabic *rizma*, a bundle [of paper]). The word came into Europe with the Moors, who brought with them into Spain the manufacture of paper from cotton), a quantity of paper. A ream of ordinary notepaper consists of 20 quires of 24 sheets each, or 480 sheets; of certain kinds of drawing paper of 472 or 500 sheets; of printing paper of 21½ quires, or 516 sheets. Writing paper is done up in ¼-ream or ½-ream packets, printing-paper in bundles of 2 reams.

Reaping, the cutting of ripe grain-crops for harvest with a sickle, scythe, or other cutting instrument or machine. A reaping-machine as distinguished from a mowing-machine bends the corn over the knives and discharges the swathes at intervals in sheaves, and apparatus for binding the sheaves is often attached. According to Pliny the Elder, the Gauls used a reaping-machine which consisted of a broad shallow barrow with a row of projecting spikes or teeth on the back board. This contrivance was pushed by oxen through the field of standing corn, the heads of which were torn off by the teeth and fell into the barrow. This was a crude and wasteful method of harvesting; nor is it at all clear why a labour-saving machine was needed in those remote centuries. In the United States it is claimed that the first practicable mechanical reaper was invented in 1831 by Cyrus Hall McCormick (1809-84), but he seems to have been anticipated by John Common of Denwick, Northumberland, and the Rev. Dr. Patrick Bell (1799-1869) of Forfarshire, whose invention was tested in 1827.

Réaumur, RÉNÉ ANTOINE FERCHAULT DE scientist, was born at La Rochelle, France, on February 28th, 1683, and was educated chiefly by Jesuits at Poitiers, Bourges and Paris. At the age of 25, he was already sufficiently distinguished to be admitted to the Academy of Sciences. He first wrote upon mathematics, but turned his attention to natural philosophy and natural history, and produced various important treatises on the manufacture of porcelain, the silk of spiders, the tinning of sheet-iron, etc., and made a great improvement in the thermometer which was named after him. His *Histoire des Insectes* (1734-42) was left unfinished. He died in the château of La Bermondière in the department of Mayenne, on October 17th, 1757.

Réaumur Thermometer differs from the Centigrade in having 80° as the boiling-point of water instead of 100° , the zero in both cases being the temperature of melting ice, and from Fahrenheit which has 212° as its boiling-point and 32° as zero. Hence 80 degrees on a Réaumur thermometer correspond to 100 degrees on a Centigrade, and 1 Réaumur degree is equivalent to $1\frac{1}{4}$ Centigrade degrees. This thermometer is named after the French physicist Réaumur, and has been most generally employed in Germany, though its use in that country and in Russia is on the wane. To convert these scales, let F, R and C represent any temperature as given by the three scales, then $F = R \times \frac{9}{4} + 32^{\circ} = C \times \frac{9}{5} + 32^{\circ}$.

Rebecca Riots, disturbances caused in 1843 in South Wales by a secret society called "Rebecca and her Daughters" (Gen. xxiv. 60). formed for the destruction of toll-gates, the number of which was a grave abuse. They culminated in the murder of an old turnpike woman on September 10th, when the authorities invoked the aid of the military in repressing them. The members went about at night in parties, often on horseback, dressed in female attire. During a severe depression of trade consequent on strikes there was a recrudescence of Rebeccaism in South Wales in 1878. Notwithstanding the agitation it was not till 1889 that the roads in that part of the Principality were generally freed from tolls.

Récamier, JEANNE FRANÇOISE JULIE ADELAIDE BERNARD, MADAME, was born at Lyons, France, on December 4th, 1777. Her father, a banker named Bernard, removed to Paris in 1784 and his daughter married, April 24th, 1793, Jacques Récamier, a wealthy banker aged 42. She formed a *salon* in Paris, which was frequented by the most celebrated people of the time, amongst some of her warmest friends being Madame de Staël and Benjamin Constant. Her house becoming suspect and she herself having Bourbon predilections she had to leave France and found an asylum with Madame de Staël at Coppet in 1806, a retreat that was none the less welcome since Récamier had been ruined the year before. In spite of the attentions of Prince Augustus of Prussia, who proposed the divorce of her husband in order that she might marry him, of Chateaubriand, at a time when they were both free to marry, and other admirers—for she preserved her beauty to the last and her conversation was unique—she gave no tongue to scandal. She died in Paris on May 11th, 1849. *Souvenirs et Correspondance tirés des Papiers de Madame Récamier* was published in Paris in 1859.

Receipt, a formal acknowledgment in writing of the payment or delivery of a specified amount of money or of property of any kind, with date, name of depositor, signature of recipient, and any other relevant particulars. Receipts in discharge of accounts of the amount of £2 and upwards must bear a penny stamp, excepting of course cash transactions over the counter. Receipts should be kept for six years from the date of payment, since no action respecting the goods or other articles received

can be brought after the lapse of that period. The word is also in customary, though hardly proper usage as a substitute for the medical *recipe*, so called from the first word (which is Latin for "take") of the prescription drawn up by the doctor in attendance on a case. Apart from its commercial sense, it is much more frequently employed in connection with cookery formulae.

Receiver, a person appointed by a court of equity or other judicial tribunal, pending litigation, to manage, control, or dispose of property under dispute; or to receive rents, profits, or produce, or carry on business until a final settlement shall have been arrived at.

Receptacle, a term variously employed in descriptive botany, but mostly used for the axial portion of a capitulum or of a single flower. The former is distinguished as a common receptacle—one, that is, common to a whole inflorescence; and the latter as the floral receptacle, thalamus, or torus. The internodes of the latter are not generally elongated; but, when elongated, the internode between the calyx and corolla is termed an anthophore; that between corolla and stamens, a gynandrophore; that between stamens and carpels, a gynophore; and that between the carpels a carpophore, as in the Geraniaceae and Umbelliferae. Other modifications of, and outgrowths from, the receptacle are known as the disc. This may be represented, as in the Cruciferae, by separate glandular outgrowths excreting honey, and included, therefore, under the head of nectaries, or they may be fleshy cup-like or ring-shaped bodies. Thus in *Victoria regia* the receptacle grows up round and imbeds the ovary, making it inferior, and carrying calyx, corolla, and stamens on an annular or ring-shaped disc, making them strictly perigynous; in *mignonette*, there is a fleshy one-sided plate within the corolla bearing the stamens and ovary, and thus hypogynous; in the orange group, it is a cushion-like mass below the ovary; in the peony, it is a cup enclosing the carpels; in *Alchemilla*, a perigynous fleshy ring round the inner surface of a tubular receptacle or "calyx-tube"; and in the Umbelliferae, an epigynous cushion carried to the top of the carpels by the adherent (*i.e.*, superior) calyx-tube. It is thus mainly dependent upon the receptacle whether the so-called "insertion" of the petals and stamens be hypogynous, perigynous, or epigynous—a point of primary importance in classification.

Reciprocity, in commerce, equality of privileges as to all, or some, imports and exports between the subjects of any two governments, established by treaty. Disputants regard it as holding a sort of middle place between Free Trade, on the one hand, and out-and-out Protection, on the other. Usually, however, it is found that the Reciprocitarians are inclined to be Protectionist.

Reclus, JACQUES ÉLISÉE, geographer, was born at Sainte Foy la Grande, department of Gironde, France, on March 15th, 1830. He was educated at Montauban (with a view at first to the

Protestant ministry) and studied geography at Berlin under Karl Ritter. The *coup d'état* drove him from France and, after spending several years in travel, he returned in 1859 to Paris, where he wrote much for the *Revue des Deux Mondes* and the *Tour du Monde*. He also published (1861) *Voyage à la Sierra Nevada de Sainte-Marthe, paysages de la Nature tropicale*, besides two books on London for the benefit of French tourists. His specialisation in geography showed itself in his *La Terre: Description des Phénomènes de la Vie du Globe* (1867-8), *Histoire d'un ruisseau* (1869), *Les Phénomènes terrestres: Les Mers et les Météores* (1873) and *Histoire d'une Montagne* (1880). Before this period he had been exiled from France in consequence of his active support of the Commune in 1871, prior to which he had well borne his part throughout the siege of Paris in the ranks of the National Guard. After spending some years in Italy and Switzerland he became in 1892 Professor of Comparative Geography in the Université Libre of Brussels. Shortly afterwards he completed the *chef d'œuvre* upon which he had been closely engaged for almost twenty years, namely, his *Nouvelle Géographie Universelle* (19 vols., Paris, 1875-94). An anarchist to the end, the friend of Kropotkin and humanity, he died at Thourout, near Bruges, on July 4th, 1905. His book on *l'Évolution, la Révolution et l'Idéal Anarchique* was published in 1898.

Recognisance, an acknowledgment upon record of a former debt. He who so acknowledges such debt to be due is termed the recognisor or cognisor, and he to whom or for whose benefit he makes such acknowledgment is termed the recognisee or cognisee. More usually it is an obligation of record entered into by an accused person, or some person or persons on his behalf, to appear in court for the continuance of a trial or for judgment. Failing the fulfilment of such recognisance the accused will remain in prison, and should he not appear at the time appointed, his own or his friend's recognisance will be estreated, that is, will be certified to that effect by extract from the record of the court of law, with a view to the enforcement of the fine or other penalty.

Recoil, the backward motion of a gun and its carriage when the gun is fired. The force of the explosion tends to drive the gun backwards just as much as it tends to drive the projectile forwards; but the latter, being lighter and having less friction to overcome, travels a great distance, whereas the heavy gun is forced only a few feet back. The arrangements of gun and carriage are generally such that after the recoil the gun returns to its former position, but in older forms it was the gunner's work to replace the gun after each discharge. The recoil of a rifle is generally known as the "kick," and is felt as a blow on the shoulder by the person firing it. Other things remaining unchanged, the velocity of recoil of a gun is proportional to the charge of powder.

Record, an authentic testimony in writing contained in rolls of parchment and preserved in courts of record. The record of *nisi prius* is an

official transcript or copy of the proceedings in an action entered on parchment, and sealed and passed, as it is termed, at the proper office. It serves as a warrant to the judge to try the cause, and is the only document at which he can judicially look for information as to the nature of the proceedings and the issues joined between the parties.

Recorder, a barrister or other person learned in the law associated with the mayor or other magistrate of any city or corporate town (having a jurisdiction or court of record within its precincts) for his better direction in the judicial proceedings of such court. Thus the Recorder of the City of London is practically the judge in the Lord Mayor's court of the City, although in theory the Lord Mayor and Aldermen are the judges therein.

Records, Public (Latin, *recordari*, "to remember"), written authenticated statements which comprise all documents, decrees, rolls, writs, accounts and proceedings of the Legislature and State from the earliest times. The Public Records of the United Kingdom are under the care of the Master of the Rolls and are stored in the Public Record Office. The importance of such a depository can scarcely be overestimated. In the Office are housed Acts of Parliament, Records of the Courts of Law, including the Courts of Chancery, King's Bench Court, Court of the Exchequer, Court of Common Pleas, Court of Arches and such obsolete courts as the Court of Chivalry, the Star Chamber and Court of Requests; the originals of State Papers and separate departmental records, such as Proclamations of the Crown, Negotiations and Treaties with Foreign Nations, Records of the Admiralty, the War Office, the Home Office, the Foreign Office and Colonial Office; and finally records of the Nation's Revenue, Trade, Manufacture, Coinage of the Realm and of religious bodies and institutions. The nature of the material used and the language in which the records are written vary a good deal from time to time. Those of Edward II. are written in Norman-French. From the reign of Henry IV. to George II. the records are couched in Latin, whilst about the year 1760 they began to be expressed in English. Usually the material is vellum or parchment made into rolls of various lengths, the longest, the Land Tax Commissioners Act of George IV., being 900 feet in length. Such records entail an immense amount of unnecessary labour when required for consultation and thus the modern method of making the records about three feet long and fastening them at the top by binding was adopted by the Common Law Courts and Court of the Exchequer, whilst the Court of Chancery still has its records joined together consecutively in the same manner as Jewish Rolls. In width the records are from nine to fifteen inches, but those of the Great Wardrobe measure from eighteen to twenty. The earliest records, including Domesday Book, were sometimes in book form, as also are many down to the time of Henry VIII., when many ways of making records were in vogue. In some cases rolls were used. In

others short skins were bound together at first to produce a short roll, but ultimately they became massive oblong books. During the reign of Charles II. these massive oblong books grew so cumbersome that it was with difficulty two men were able to move them about. In the Lower Courts the records of fines and writs were simply pierced and fastened by a piece of string or gut. Tallies of hazel wood were also in use and served as Public Records of the Exchequer accounts. These continued to be employed until 1783. In 1834 they were destroyed owing to their having caused a conflagration in which the old Houses of Parliament were burned. The more important Public Records are now made on parchment, while minor ones are simply recorded on paper and filed in the ordinary way.

History. The oldest record in possession of the Record Office is the *Domus Dei Book*, or *Domesday Book*, begun in 1080 (or, according to some, 1085) and completed in 1086. [DOMESDAY BOOK.] Parchment was first used for the record rolls at some period soon after the Norman Conquest. The earliest extant dates from the reign of Henry I. But as a class the Great Rolls (*Rotuli Annales*) or Pipe Rolls have the greatest antiquity. The first of these dates from the reign of Stephen, the Great Roll for the year 1140 being the only one of the records of that king surviving. Of those of Henry II. only the first, eighth and nineteenth rolls are missing, whilst those of John and Henry III. are complete, as are all down to the reign of Richard III., except in six or seven cases where one here and there is missing in a reign. Taken as a whole the Pipe Rolls are most interesting. Originally they were called the Great Rolls, but from their shape received the name of Pipe. They comprise yearly accounts of all taxes collected throughout England, of fines, reliefs paid by offenders, and fees for liberty to begin suits of law paid to the Exchequer. The earliest of them cover a period of history before the Close Rolls of John and, by carefully studying these accounts (for each item and payment is put down separately), a fairly accurate history of the time is obtained. The Pipe Rolls Society was founded in 1884 and has undertaken the gradual printing of this store of National History. The *Testa de Nevill*, or *Liber Feodorum*, is a very similar book of almost the same date and was printed by order of the Record Commission in 1807. Its institution is doubtful, but it is almost certain that it was begun towards the close of Edward II.'s reign. Next in age to the Pipe Rolls come the Charter Rolls and Patent Rolls, dating from the first and third year of King John respectively. They contain Grants of Offices and Lands, Restitutions to Ecclesiastics, the creations of Peers, Commissioners and Justices of the Peace whose patents pass under the Great Seal. Next in importance are the Close Rolls, being more or less the private correspondence of the Kings with their High Sheriffs, besides State correspondence at home and abroad, such as Proclamations to the Army and Navy, Summonses to Parliament and the regulation of the Coinage. Then there are the Rolls of France, Rome and Almain, Liberate Rolls, Norman and Gascon

Rolls, Redisseizin Rolls and Confirmation Rolls, all more or less of the same nature. The principal Rolls of the Courts are the Feet of Fines, which include the ending of all suits as to the right to land. The *Rotuli Curie Regis* are the records of the King's Court between the reigns of Richard I. and Edward I. De Banco Rolls are the records of the Court of Common Pleas and the *Coram Rege* Rolls those of the King's Bench, including Coroners, Assize and Gaol Delivery Rolls. The Records of the Court of the Exchequer were called the *Originalia* and begin in the reign of Henry III. They were records of revenues, rents and dues, or the accounts of services rendered to the Crown and of the names of State Officers. The Records of the Court of Chancery are one enormous bulk of cases heard and proven in that Court. The Subsidy Rolls of the Exchequer contain names of taxpayers, the Customs Rolls are of laws and rules relating to ports and harbours and the Parliament and Statute Rolls are records of the proceedings of the Lords and Commons. In early times the king often took his records with him from place to place and it was the duty of the church of the city where the king stayed to provide horses to remove these records to the next halting-place. After a time the records grew so bulky that they were stored in the palace, where they were soon worn-out, stolen or tampered with. After the Courts had ceased to be held in the precincts of the king's palace it became usual for each Court to store its own records, but after a time these attained such enormous bulk that the Courts could no longer hold them and it was found necessary to provide other storage. In the reign of Richard I. all documents relating to the Court of Chancery were placed in a room in the Tower, which was known as the Record Office. Those of the King's Bench and Court of Common Pleas were likewise deposited in the Cloisters of Westminster Abbey, while other documents were placed in the Rolls Chapel Office. But the nation's records soon overwhelmed these premises and other accommodation had to be found. Thenceforward the public records suffered much from the heedless way in which they were stored. Any vacant space or vaults in Government buildings, and even in private houses were thus employed. The parchments decayed, were attacked by dust and the destructive book-worm and often many of the most curious and most valuable were stolen. In Elizabeth's reign an order was made that the Public Records should be cleaned, dusted and stored away properly; but the order would appear to have become a dead letter. William Prynn, the keeper of the Chancery Records at the Tower in the time of Charles II., urged that king to make drastic reforms in the methods of the Record Office, but this, like previous attempts, ended in smoke and at the beginning of the 19th century the Public Records were still in their filthy condition in store-rooms at the offices of the Duchy of Lancaster and Cornwall, the Tower, Westminster Hall, Carlton Ride and Whitehall Yard, the Augmentation Office, Palace Yard, the Land Revenue Office, Pell Office and Exchequer of Pleas, Whitehall, and the Pipe Office and Lord Treasurer's Office, Somerset House,

and First Fruits Office, Temple. In this condition they remained until the reign of George III., when the question again rose as to their safety and it was discussed in Parliament. In 1800 a Record Commission was appointed, to sort, index, and catalogue the records. But the task was difficult and one Commission after another failed to accomplish it until one was appointed in 1831 which began useful work. The Master of the Rolls was given absolute custody of all records by Act of Parliament and a Deputy Keeper was appointed who, since 1840, has issued an Annual Report upon the documents under his keeping. He has the management of the staff, although the Master of



NEW RECORD OFFICE, CHANCERY LANE, LONDON.

(Photo: Pictorial Agency.)

the Rolls is nominally head. He fixes fees to be paid for searching, appoints Deputy Assistant-Keepers and carries out all orders issued by the Home Secretary, who from time to time directs new catalogues, indexes and calendars to be made. By the middle of the 19th century the work of cataloguing, indexing and methodising the records of England was rapidly progressing. In 1851 moneys were voted for the erection of suitable buildings in which they could be preserved, enough space being allowed for the future growth of the documents within a reasonable period. In the same year the building of the Record Office was begun and in 1858 it was ready for occupation. It is a massive, handsome granite building situated between Chancery Lane and Fetter Lane, London, and its grey walls look as if conscious of the historic documents that rest there. It was enlarged in 1898 and completed in 1900. The fees of the

Record Office are based according to the nature and the date of the record to be searched, but in cases where the searcher's aim is historic or literary he is allowed to prosecute researches free of charge. The administrative expenses of the Record Office may be approximately estimated at £24,000 a year.

In Scotland the making of the National Record was begun in 1282, and until 1651 inventories were taken of the Public Archives. At the latter date however, Cromwell ordered the Scottish Rolls to be brought to London from Edinburgh and placed in the Tower. In 1657 some of these were restored but on a second batch being sent from Edinburgh to London by sea they suffered shipwreck and the documents were never recovered. Until 1787 the Scottish Records had been stored at Edinburgh Castle, when the General Register House was built in Edinburgh, from designs by Robert Adam, and the Lord Clerk Register, who had previously been Keeper of the Records at the Castle, was continued in his post. In the General Register House are kept the Records of the Acts of the Scottish Parliament, those of the Privy Council, Courts of Justice, of the Great Seal, the Privy Seal and Signet. The Retours of Services are also amongst the Scottish Records. They came into use about 1541 and continued until 1847 and comprise the verdict found by juries in cases of intestacy between those dates. From 1847, however, the Sheriff of Chancery, or the County Sheriff, decided these cases. The counties of Scotland each have their records usually stored and indexed in the municipal buildings of the county towns, as is the case in England.

In Ireland there are, owing to war and destruction and the unsatisfactory way in which they have been stored, but few records that bear an ancient date. At the beginning of the 19th century they were still left uncared for, a prey to dust and book worms, in various parts of the country. In 1810 an Irish Record Commission was appointed which until 1830, did good work in collecting and preserving documents. In 1847 a second Record Commission was appointed and in 1867 the Public Record of Ireland Act was passed and, since 1869, the Deputy Keeper has annually published a report of the Irish documents. Though, as is seen, they have in the past been much neglected, the United Kingdom can boast that her Public Records are the best collection of such documents in the world. The French records date only from Louis XIV.'s time and those of Germany and Italy from about the middle of the 17th century.

Recovery of Land. This is the present title of an action for recovery of possession of land which has taken the place of the old action of ejectment under the Judicature Acts, and it lies in all cases where an action of ejectment formerly did. [EJECTMENT.]

Rectification, a term applied to the purification of liquids, chiefly of organic liquids, spirits etc. The purification is effected usually by fractional distillation, frequently with some solid previously added to the liquid to retain some of the impurities present.

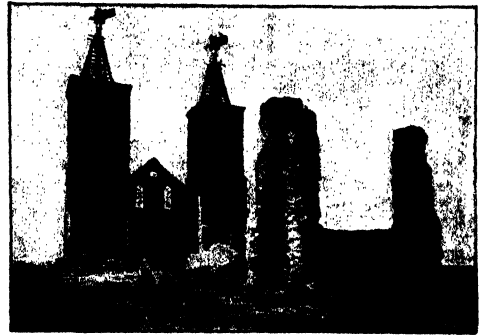
Rector, a clergyman in charge of a parish and in full possession of all accruing rights and privileges. He differs from the vicar in that the latter enjoys only a proportion of the ecclesiastical income specially attached to the vicarage. The curate is subject to the incumbent, whether rector or vicar, and his salary is not fixed by law, but by the incumbent for whom he does duty or by the patron who preferred him. In the Roman Catholic Church the rector is the ecclesiastic in charge of a congregation, college, or religious house and, particularly, the superior of a Jesuit seminary or college.

Rectum, the terminal portion of the alimentary canal, which pursues a fairly straight course (hence its name) from the lower end of the sigmoid flexure of the large intestine to the anus.

Diseases of the Rectum. Particular diseases such as fistula, prolapse and piles have already been dealt with in this work under their own names and need not now be further referred to. Stricture of the rectum may be fibrous or malignant; the chief symptoms are pain and constipation, with occasional passage of narrowed ribbon-like motions. The form of malignant disease (cancer) that usually affects the rectum is epithelioma. In addition to the obstructive symptoms mentioned, the occurrence of bleeding and the manifestation of general signs of cachexia are common symptoms in this condition. Treatment may consist in excising the new growth if the disease is limited, or the operation of colotomy may be indicated if excision is impracticable and if the symptoms of stricture assume prominence. The rectum is sometimes affected by polypus or by ulceration. Anal ulcer or fissure is a very distressing complaint, which, happily, is readily cured by proper treatment. Pruritus ani, the condition of irritation or itching about the anus, is a common and troublesome malady. It may be due to threadworms or to pediculi, and may be associated with piles or with the gouty diathesis. If there be no removable local cause, treatment consists mainly in administering salines, the promotion of healthy action of the skin, and the use of ointments.

Reculver, a village of North Kent, England, 3 miles E. of Herne Bay. It was the Roman station of Regulbium established to command the Stour, then navigable, separating the island of Thanet from the mainland. Owing to the encroachments of the sea the Early English church, a venerable structure, is in ruins. The remains include the twin towers, which are known as "The Sisters" from a local tradition. Frances St. Clair, abbess of the Benedictine nunnery at Faversham, being sick unto death, vowed, if she recovered, to visit the shrine of the Virgin at Bradstow (Broadstairs) and there deposit a costly thank-offering. Accompanied by her sister Isabel she set sail, but the ship struck a sandbank near Reculver. The abbess and part of the crew reached the shore in a boat, and though Isabel was rescued later she died next day. In her memory, as well as to warn mariners of the inhospitable coast, the abbess caused the church towers to be repaired and spires to be added,

commanding further that the towers should be styled "The Sisters." They were purchased by Trinity House in 1810, and steps were taken to ensure their preservation. Reculver was the site also of a palace of Ethelbert, King of Kent, and in the



"THE SISTERS" RECVLVER.
(Photo: Chester Vaughan, Acton, W.)

7th century a monastery of Black canons was erected here. Pop. (1901), 256.

Red. [PIGMENTS.]

Redan, a field fortification constructed of earth thrown up to form two parapets presenting the salient angle or apex to the enemy and unprotected at the rear. It is the simplest type of defence work and is employed only for purely temporary purposes.

Redbreast. [ROBIN.]

Redcar, a watering-place on the coast of the North Riding, Yorkshire, England, 5 miles N.W. of Saltburn. It was once a humble fishing-place, but, in consequence of its bracing air and beautiful stretch of firm smooth sands, has become a popular midsummer resort. It has an esplanade, a pier, and other features of a seaside holiday haunt. Pop. of extended area (1901), 7,695.

Red Cross, the cross of St. George, the patron-saint of England. It is also the badge of the Knights Hospitallers, of the order of St. John of Jerusalem, and of the modern revival of the English "language" of that order as a society for ambulance service, and of similar foreign societies. The red cross was internationally recognised as a symbol of neutrality at the Geneva Convention of 1864. The Order of the Red Cross was instituted in 1883. It is conferred upon women who have distinguished themselves in tending the sick and wounded, and is bestowed on the recommendation of the Secretary of State for War. [NATIONS, LAW OF; NURSING.]

Red Deer (*Cervus elaphus*), a large deer from Europe and Western Asia, and North Africa, if the Barbary Deer be, as is probable, a mere variety. In England the Red Deer is wild on Exmoor; it is also found in the Highlands of Scotland and the

west of Ireland. The male is called a stag and the female a hind. A full-grown stag stands about four feet high at the withers; the neck is greyish, the body reddish-brown, and the rump is marked with white. Only the males bear antlers, which show signs of growth in the first year, appearing in the second year as unbranched beams; the first branch is gained in the third year, and when twelve are present the animal is known in Scotland as a "royal stag." The antlers are shed in spring. The most superb examples of Red Deer are found in the old forests of Germany and Hungary. In the British Isles the conditions of life and the food are not of the quality that develops first-rate antlers, while the practice—prevalent in Scotland, for instance—of shooting those with the finest heads leaves the poorer specimens to perpetuate their



RED DEER.

(From the painting, "The Monarch of the Glen," by Sir E. Landseer, in the possession of Thos. J. Barratt, Esq.)

race. The stag in summer is a lordly creature, while in winter its coat becomes longer and acquires a greyer tint. The wild deer of Exmoor are hunted with horse and hound, while in Scotland they are stalked and shot with a rifle. In certain parts of the south of England the hunting of the stag has degenerated into the repeated chase of a few individuals deprived of their antlers and discharged from boxes shortly before the "sportsmen" put in an appearance.

Redditch, a finely-situated town partly in Warwickshire and partly in Worcestershire, England, 13 miles S.W. of Birmingham. The surrounding groves are the haunt of nightingales and on Gorgot Hill in the vicinity is said to be the veritable bank of wild flowers which Shakespeare knew. In the spring it is a-bloom with primroses, cowslips, violets, wild thyme, bluebells and other plants. Gorgot Hall, close by, is a quaint, ramshackle, half-timbered house, certainly as old as Elizabeth's

reign. Redditch is the headquarters of the manufacture of needles and fish-hooks, both of which enjoy a world-wide reputation. Traces still exist of the Cistercian abbey of Bordesley, founded in 1131 by the Empress Maud and dedicated to the Virgin. It belongs to the Earl of Plymouth, whose place Hewell Grange, is near Redditch. Pop. (1901) 13,493.

Red-Eye (*Leuciscus erythrophthalmus*), a fish allied to the Roach, occurring in Great Britain throughout Europe and in Asia Minor. Its eyes are bright red—hence its name—and the fins are red too, though the colour is more marked in the lower than in the upper fins. The body is brown or sometimes bluish-green. It does not exceed two pounds in weight and is good eating. It is also called Rudd from its red fins.

Redgrave, RICHARD, painter, was born in London on April 30th, 1804. For a few years he was employed as a draughtsman in the office of his father, a manufacturer of wire fencing, but attended the Royal Academy Schools in 1826. For nearly fifty years he was a constant exhibitor at the Royal Academy, of which he became an Associate in 1841 and a full member in 1851. During the first half of his career he painted mostly *genre* and subject drawn from English literature, while during the second half landscapes were much more frequent. Among his pictures may be mentioned "Quentin Matsys, the Blacksmith of Antwerp" (1839), "Sir Roger de Coverley's Courtship" (1841), "Ophelia," "Cinderella" (1842), "The Governess" (1845), "Country Cousins" (1848), "The Awakened Conscience" (1849), "The Flight into Egypt" (1851), "An Old English Homestead" (1854), "The Golden Harvest" (1861), "The Mill Pool" (1875) and "The Heir come of Age" (1878). He organised the Government School of Design, of which he became head-master in 1848. In 1857 he was appointed inspector-general for Art, as well as the surveyor of Crown pictures, in which capacity he catalogued the Royal collections, and in 1874 was promoted to the directorship of the Art section of the Education department. Along with his brother Samuel (1802-76) he was author of *A Century of Painters of the English School* (1866) and was instrumental in securing for the nation the gifts of the Sheepshanks and Ellison collections. He died in London on December 14th, 1888.

Redhill, a town forming the eastern portion of the borough of Reigate, Surrey, England, 1 miles E. of Dorking. The principal buildings are the Gothic churches of St. Matthew and St. John the Evangelist, the market hall, the cottage hospital and the schools of the Royal Asylum of St. Anne's Society, a charitable body founded in 1702 for the clothing and educating of the sons of parents in reduced circumstances. The Philanthropic Society established in 1788 for the reformation of juvenile offenders, which may be said to be the author of the reformatory system in England, has had a great success in training boys who otherwise might have developed criminal habits. The Society's Farm School is situated in Redhill. The industries include brewing

and farming, besides fuller's earth works and the quarrying of silver sand. The town council holds its meetings alternately in Reigate and Redhill. Pop. (1901), 15,732.

Redia, a stage in the life-history of the Liver Flukes (Trematoda) when the animal lives in the body of pond-snails or fish. They may give birth to other series of redia or to a free-swimming tailed form known as the Cercaria.

Reding, ALOYS, Swiss patriot and soldier, was born in 1765 and entered the army of Spain, from which he retired in 1796 to return to his native canton of Schwyz, where he organised the resistance to the French two years later. Although his forces behaved with wonted valour he was compelled to yield to numbers, but obtained important guarantees for the canton. Later he was one of the leaders of the Federalists, became a member of the Senate and then President of Switzerland. In this capacity he went to Paris to treat with Napoleon and Talleyrand, but was shortly afterwards thrown out of office by the Unionist party. He then was made chief of Schwyz and, in 1802, after the Diet had been dissolved, was imprisoned by the French in Aarburg. He died in 1818.

Red-Lead, an oxide of lead represented by the formula Pb_2O_3 . It has been known from early times, and was formerly called minium, but was only partially distinguished from cinnabar and realgar. It is prepared by carefully heating litharge [LEAD] in reverberatory furnaces with air-supply until the oxidation of the litharge has gone on sufficiently; but its brilliancy, and hence its value as a pigment, can be much diminished by insufficient care during this oxidation. It forms a bright red or scarlet powder which is largely employed as a pigment and also in the manufacture of flint glass.

Red-Poll, RED-POLE. [LINNET.]

Red River, a name given to many streams, the most noteworthy of which are:—(1) The Song-ka, which, rising in the Chinese province of Yun-nan, flows south-easterly through Tongking and falls into the Gulf of Tongking, after a course of nearly 600 miles. Though obstructed by several rapids, it is navigable for light boats as far as the Chinese frontier. Ha-noi, the capital of Tongking, is situated on its lower course. (2) The Natchitoches, which rises in the north-west of Texas, flows eastwards as far as Fulton in Arkansas, then southwards to Shreveport in Louisiana, whence it runs in a south-easterly direction to the Mississippi after a course of 1,200 miles. The stream partially discharges into the Gulf of Mexico by the Atchafalaya Bayou and at low water may be cut off altogether from the Mississippi. (3) The Red River of the North, rising in Traverse Lake on the borders of Minnesota and North Dakota, runs due north, crossing the Canadian boundary into Manitoba, and ultimately discharging into the southern end of Lake Winnipeg, after a course of nearly 700 miles.

Red River Settlement was founded on the Red River of the North in Manitoba by the Earl of

Selkirk in 1812-17 as a refuge for the surplus population of the Scottish Highlands. Much opposition was raised to the colony and conflicts repeatedly took place between the settlers and the armed forces sent by the North-West Fur Company to evict the intruders. The Earl himself was tried in 1818 for conspiring to ruin the trade of the company and fined £2,000, though there seems to have been a serious miscarriage of justice, the Canadian Lench being packed with legal friends of the pursuers. By 1835 the territory, with a mixed population of 5,000, including many French-Indian half-breeds (Bois-Brûlés), was retransferred to the Hudson Bay Company. In 1869 the settlement was given over to the Canadian Government, when the French half-breeds under Louis Riel revolted and endeavoured to set up a republic, but the movement collapsed.

Redruth, a town of Cornwall, England, 9 miles W. of Truro. It is the centre of the tin mining operations of the county. Copper was also once extensively mined and other industries include brewing, tin-smelting, the making of safety fuses and iron-founding. The principal buildings comprise St. Uny's Church, the grammar school, the granite Town Hall, the masonic hall, the public rooms, mining exchange, science and art school and Passmore Edwards free library. The town, originally named Uny, is said to have received its present name, a corruption of *Dre druth* or "Druids' town," to preserve the fact that it was the headquarters of the religious observances of the ancient Britons. Of these rites, relics may be found in the standing stones, cairns, remains of cromlechs and, particularly, in the Rock of Sacrifice where human beings used to be offered up. Pop. (1901), 10,451.

Red Sea, THE, stretches south-east from the heads of the Gulfs of Suez and Akabah to the Strait of Bab-el-Mandeb and the Gulf of Aden, a distance of about 1,450 miles. Its width is from 115 to 200 miles, except at the two extremities. The depth in the middle is about 1,200 fathoms, and it grows shallower towards each end, there being only 200 fathoms in the Strait. The bed is gradually being upheaved. As it receives no rivers, it is much affected by evaporation and is saltier than the ocean. The coasts on each side are fringed with enormous coral reefs, those on the east being the largest and most dangerous. The climate is one of the hottest in the world, but violent storms are infrequent. Submerged islands are the chief source of danger to vessels. Good harbours are few, Mocha, Yembo, Jidda, Hodeida and Loheia being the best on the Arabian shore, whilst on the African side are Suez, Kosseir, Massowa and Suakin.

Red Snow, a unicellular alga belonging to the order Protococcales, which contains a considerable proportion of red colouring-matter, and covers large tracts of snow in Arctic or Alpine regions in very short spaces of time. It is variously known as *Protococcus*, *Palmella*, and *Chlamydomonas nivalis*. Its cells are about .004 millimetre in diameter, and

may contain some chlorophyll in addition to their red pigment palmellin. By absorbing the heat rays this plant seems to bring about the melting of the snow. One allied form (*P. cruenta*) occurs at the base of damp walls, and another (*P. prodigiosa*) on bread, meat, etc.

Redstart (*Ruticilla phoenicea*), a European warbler migrating southwards in winter. About the middle of April it visits Great Britain, remaining to breed, and since 1885 it is recorded as having bred in County Wicklow, Ireland. The adult male bird is a little more than five inches long, and has the forehead white, the throat black, the upper surface dark grey, and the breast, sides, and tail rust-red, whence its popular name (from Anglo-Saxon *steort*, "a tail") and its local name Firetail. It is an insect-eating bird, and the young are fed on caterpillars. The nest, of moss and dry grass lined with hair and feathers, is usually made in holes in trees, walls, or rocks, and the eggs are from five to seven, greenish-blue with faint red spots. The Black Redstart (*I. titys*), also a British visitor, has a more limited range.

Redwing (*Thurdus iliacus*), a bird allied to, but somewhat smaller than, the Common Thrush, which it resembles greatly in plumage, but the under wing coverts are red. It visits Great Britain in the winter, returning northwards in the spring.

Reed, a term applied to several species of large aquatic grasses, and extended to members of other orders, such as the bulrushes (*Scirpus*) among the sedges, and the bur-reed (*Sparganium*) and reedmace among the Typhaceae. The common reed (*Phragmites communis*), the largest British grass, familiar throughout the northern hemisphere, has stems from 5 to 10 feet high and plume-like panicles of flowers. It aids in binding together soil, in impeding river denudation, in causing the deposition of sediment and in contributing to peat. Reeds were formerly used for arrows and musical instruments, are still cut into pens in the East, and are largely employed as thatch.

Reed, in acoustics, a contrivance for breaking up a continuous current of air into a succession of discontinuous puffs. This device generally takes the form of a tongue placed over a rectangular orifice in a pipe. The current of air can only enter the pipe through this orifice, and when the tongue is flexible the rate of vibration of the column of air controls that of the reed; this is the case in the clarinet and oboe. When the tongue is stiff, as in the organ, its vibrations control those of the pipe; to get the best result the length of the tongue should be such that its natural rate of vibration corresponds to that of the fundamental note of the pipe or one of its overtones. If the reed can pass to and fro through the orifice it is said to be free, and such reeds occur in instruments like the harmonium or concertina. When the reed covers the slit so that it cannot pass through it, its vibrations merely open and close the orifice, and it is known as a beating reed; this is the form usually occurring in organ pipes, and is specially used for the trumpet stop. The pitch of beating

reeds rises as the pressure of the wind is increased, but the pitch of free reeds remains unaltered. Temperature affects reed pipes by altering the elasticity of the tongue, the note becoming flatter as the temperature rises. In the clarinet and bassoon the tongue is generally a piece of cane, while in the bugle and trumpet the lips of the player act as the reed.

Reed, SIR EDWARD JAMES, naval constructor, was born at Sheerness, Kent, on September 20th, 1830, and educated at the School of Mathematics and Naval Construction in Portsmouth. Becoming an expert in the designing and building of ships, he edited for a time the *Mechanics' Magazine*, and subsequently was appointed secretary to the Institute of Naval Architects. His original and independent views on the subject of the dimensions of ironclads so impressed the Lords of the Admiralty that, in 1863, he was made Chief Constructor to the British Navy. His pronounced opinions on the building policy of the Government and the high rigging of sea-going turretships created friction and led to his resignation in 1870. But the foundering of *The Captain*, a type of the battleship on which he had animadverted, soon afterwards afforded a significant comment on the soundness of his judgment. He now began to design and build warships on his own account and counted most of the Powers among his clients. A keen politician, he sat for Pembroke Boroughs from 1874 to 1880, when he was knighted, for Cardiff from 1880 to 1895, and again from 1900 to 1906. Among several books of which he was the author may be named *Our Ironclad Ships* (1869), *Letters from Russia* (1875), *Japan* (1880), *The Stability of Ships* (1884), a novel *Fort Minster*, M.P. (1885), *Modern Ships of War* (1888, in collaboration with Admiral Sampson) and *Poems* (1902). He died in London on November 30th, 1906. His son EDWARD TENNYSON REED (born, March 27th, 1860) became one of the most distinguished artists on the staff of *Punch*.

Reed Bird. [BOBOLINK.]

Reed-Mace, or CAT'S-TAIL, the popular name of the two British species of the genus *Typha*, often erroneously called bulrushes. They are aquatic monocotyledons, with very long distichous linear leaves and a cylindrical tapering spadix, the lower part of which is a brown velvety mass of female flowers and the upper deciduous portion a slender, tapering spike of male ones. The perianth is represented only by tufts of hair, and the fruit is an achene with one pendulous albuminous seed.

Reefs. [CORAL-ISLANDS.]

Reel, a lively dance in double time, performed by two or more couples; it consists of various entwining figures, their chief feature being their circular character, the dancers facing each other in single file and describing a series of figures of 8. It is probably of Celtic origin, indigenous to the British Isles, whence it spread to Scandinavia. The music should be supplied, *par excellence*, by the bagpipe.

Reeves, JOHN SIMS, vocalist, was born at Woolwich, Kent, on September 26th, 1818. He received some instruction in music from his father, and studied harmony under W. H. Calcott and the piano under J. B. Cramer. He was organist at North Cray church at the age of fourteen, by which



JOHN SIMS REEVES.
(Photo : Barnaud.)

time he could play several instruments well. Abandoning medicine for the stage, he made his *début* in 1839, at Newcastle-on-Tyne, as the "Gipsy Boy" in *Guy Mannering*. Returning to London in 1842, he appeared at the Grecian Theatre in the City Road, under the name of Johnson, and afterwards was the tenor in Macready's company at Drury Lane. He next took lessons in Paris and Milan, appearing at La Scala as "Edgardo" in *Lucia di Lammermoor* with distinct success. His voice had now acquired exquisite charm and he had developed considerable ability as an actor, but he ultimately gave up the stage for oratorio and concert in which he reigned supreme until 1891 when, with the exception of a few rare appearances, he practically retired. He died at Worthing on October 25th, 1900.

Reeves's Pheasant. [PHEASANT.]

Referendum. In the assemblies of the old Swiss Confederation and of certain cantons the delegates were required to refer certain questions (generally financial) to their governments before deciding them. In the 19th century the name was transferred to a provision of nearly all the Cantonal Constitutions and the Federal Constitution after 1848; it was first known as the Veto, and is probably largely due to Rousseau's teaching. Any constitutional amendment must be submitted to a popular vote before becoming law; so must any Bill which has passed the legislature provided a

certain number of citizens sign a demand within a certain time (30,000 citizens, or eight cantons, for the Federal referendum). M. Numa Droz, an eminent Swiss Radical, calls the institution a "legislative phylloxera;" and of 23 Federal referenda out of a possible 144, held between 1848 and 1891, as many as 14 had resulted in rejection. Nevertheless, it is very probable that progressive communities will sooner or later adopt the referendum and the fact that its results make for a conservative rather than a drastic policy goes to show that the institution is not likely to be abused. It is nothing but an attempt to reduce to practical politics the maxim, *Vox populi vox Dei*.

Reflection. Radiation falling upon any bright surface is either partially or totally reflected, according to the nature of the surface. It will be simplest to consider the reflection of that particular form of radiation which we call light. If we let a beam of light fall upon a polished surface—say, a plane mirror—we shall note that the reflected beam and incident beam are in the same plane with the normal to the mirror at the point of incidence, and both beams make the same angle with this normal. If the mirror be perfectly smooth and bright, it would only be able to reflect light in this regular manner; hence it would give us images of other bodies, but would itself be invisible. Bodies, however, do not usually reach this state of perfect polish, but irregularities in the surface cause the light to be irregularly reflected. Every incident ray is reflected according to the above laws, but differences in inclination of a multitude of small surfaces making up the whole, produce the effect of the light being reflected in all directions. This is what is known as diffusion of light, and it is in virtue of this that a body becomes visible. A plane mirror produces an image behind it exactly similar in size and shape to the object in front. Thus, let A B be an object in front of a mirror, M M' (Fig. 1). A pencil of rays, A P, starting from A, is reflected in

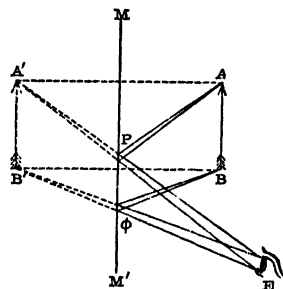


FIG. 1.

the direction P E, and appears to the eye (E) of an observer as though it came from a point A'. Similarly the pencil B ϕ is reflected so that the reflected rays seem to start from B'; and every point in A B similarly sends out beams of light, the result being the formation of the image A' B', which is virtual, since the rays P E, etc., do not actually

pass through it. It is easy to show that AB and $A'B'$ are equal and equi-distant from $M M'$. An image formed by a plane mirror is not a facsimile of the object; thus an image of the page of a book bears to the page itself the same relation as the type does to the actual print. If two mirrors be placed parallel to each other, an infinite number of images will be formed of an object between them, and a symmetrical arrangement of images is always formed when the angle between two mirrors is an aliquot part of 360° . This principle is employed in the kaleidoscope. Mirrors are frequently made spherical in shape, and in this case an image is formed which is usually not so sharply defined as in the case of a plane mirror. This is due to spherical aberration. In the case of a concave mirror, when the object (O) is farther away from the mirror than the centre of curvature (C), the image (I) is smaller than the object, and is formed between C and a point (F) half-way between C and

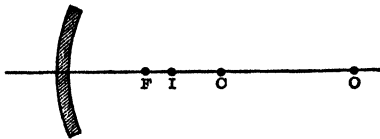


FIG. 2.

the mirror (Fig. 2). As the object moves towards C , the image, which is real and inverted, moves to meet it, so that both coincide at C . As an illustration of this, a man may so arrange matters that his hand may appear to be shaking its own image. If the object be between F and the mirror, the image is behind the mirror, is erect and virtual. If an object, $A B$, be placed in front of a convex mirror, the image $A' B'$ is behind the mirror, and is virtual and erect. This is shown in the accompanying figure (Fig. 3), and the construction is

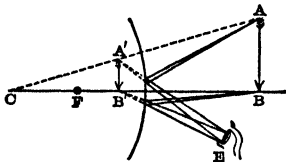


FIG. 3.

equally easy for the cases quoted previously with regard to a concave mirror. Concave mirrors are often used for medical purposes, since light can be concentrated on any special object by means of them. They are also used in reflecting telescopes. Convex mirrors are not often employed.

Reform, in English politics, specifically the removal of abuses and restrictions relating to the election of parliamentary representatives, tending to place the franchise on a more democratic basis. The first Reform Bill of 1832, demanded by a genuine and impressive display of public feeling, increased the representation of large towns, abolished many small borough constituencies, in which

election was determined either by bribery or the will of an influential person, and extended the franchise. In 1849 and 1866 Lord John (afterwards Earl) Russell introduced Reform Bills, which were thrown out. In 1867 Mr. Disraeli (afterwards Earl of Beaconsfield) got a Reform Bill passed which gave household suffrage in boroughs and lowered the qualification for the county franchise. In 1884 Mr. Gladstone's Government introduced a Reform Bill, which virtually established manhood suffrage, in connection with a Bill for the Redistribution of Seats. The Ballot Act and the Acts for the suppression of corrupt practices at elections were also measures of reform. In 1906 and 1907 the agitation in favour of extending the suffrage to women took an acute form and it seemed probable that this measure of reform could not be much longer delayed, especially since the Liberal Premier (Sir Henry Campbell-Bannerman), the leader of the Opposition (Mr. A. J. Balfour) and many statesmen of both parties were in sympathy with the movement. But the tactics of the "suffragettes" alienated public opinion to some extent.

Reformation, in Church history, the great movement in favour of reform in the doctrine and practice of the Roman Church which resulted in the establishment of Protestant Churches in the 16th century. The Paulicians in Bulgaria, Italy, and Spain, the Albigenses (12th century) and Waldenses in France, Wyclif in England, and Huss in Bohemia, had all exhibited the spirit of Protestantism in various degrees and directions; but no sect successfully maintained its ground against the Papal power until Leo X., in 1517, by the sale of indulgences [JUBILEE], provoked Martin Luther to revolt. The Reformer was supported by the princes of Saxony, Hesse, Brandenburg, and other German states, his teaching being formulated (1530) at the Diet of Augsburg in the Confession of Augsburg, drawn up by Melancthon, and in 1552, after a long struggle, the Emperor was forced to agree to the Protestants enjoying a fair amount of religious equality throughout Germany. Soon after Luther's demonstration at Wittenberg, Zwingli inaugurated the Reformation at Zürich, whence it spread over several cantons of Switzerland. After Zwingli's death Calvin and Farel took the lead at Geneva (1536) of the Swiss Protestants; while in 1528 Martin Bucer introduced Lutheran doctrines into Strasburg. Meanwhile the movement spread and took a firm hold on Scandinavia and the Low Countries. It gained a footing in England in the reign of Henry VIII., and rose finally into the ascendant on Elizabeth's accession in 1558; while John Knox preached its doctrines in Scotland from 1560 with such effect that Catholics soon fell into a minority in that country. The tide reached its flood soon after the last date, and by 1570 the Jesuits brought about the re-establishment of Papal ascendancy in Austria, Bavaria and Tirol, and regained ground in Germany, the Low Countries, France and the Peninsula. Nevertheless the Reformation broke the power of Rome for ever.

Reformatory, an institution for the reclamation, by discipline, instruction, and moral influence,

f youths who have begun a vicious or criminal course of life and whose homes or haunts are considered to be likely to exercise evil influence. Sometimes juvenile offenders are sentenced to be detained for a specified term in a reformatory which is under State control. The industrial school is an outgrowth of the reformatory. It is intended for non-criminal children below the age of fourteen who, guilty of nothing more heinous than idling, vagrancy and want, may be taken in hand in time to save them from the pernicious example of possible evil companions and taught, fed and trained into good citizens. The fact that no taint of actual crime of any sort is permitted to rest upon these schools has led to their subserving a decidedly useful purpose.

Reformed Churches, the name given to the Protestant Churches which originally followed Huldreich Zwingli and Calvin as distinguished from Lutheran congregations. In the United States the term is applied to the Dutch churches which formed a mission in 1770, resettled in 1812; to the German Reformed Church organised in 1747; and to an Episcopal Church founded in 1873. In South Africa the Dutch Reformed Church is the predominant Christian body in Cape Colony, the Orange River Colony and the Transvaal.

Reformed Presbyterians, or CAMERONIANS, a body of Presbyterians in Scotland established between 1681 and 1687, who received their popular name in commemoration of Richard Cameron, the Covenanter, who fell in the battle of Drumclog, in Ayrshire, in 1680. A disruption in the sect took place in 1863, when a few congregations withdrew rather than countenance any departure from the strict discipline of their constitution in such matters as the oath of allegiance, the exercise of the franchise, participation in the volunteer movement and other civic affairs. In 1876 the major body formally joined the then Free Church, recognising it to enjoy complete independence of State control.

Refraction signifies, in optics, the changing of direction which a ray of light undergoes when it

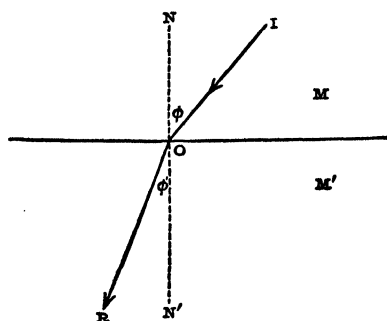


FIG. 1.

passes from one medium to another, and is due to the fact that the velocity of the waves of light is

different in the two media. If IO be the incident ray in a medium M (Fig. 1), it is found that the refracted ray OR is bent nearer the normal NN' when the medium M' is denser than the first. Hence ϕ' is less than ϕ . But the sines of ϕ and ϕ' are proportional to the velocities of light in the two media; so $\frac{\sin. \phi}{\sin. \phi'}$ must be constant for the same

two media. Experimentally, the ratio $\frac{\sin. \phi}{\sin. \phi'}$ has been shown to be constant, and this constant is generally represented by the Greek letter μ when the first medium M is air; μ is then called the index of refraction of the second medium M'. Let a pole, A B, be plunged into some liquid—say, water—whose surface is SS' (Fig. 2). A pencil of

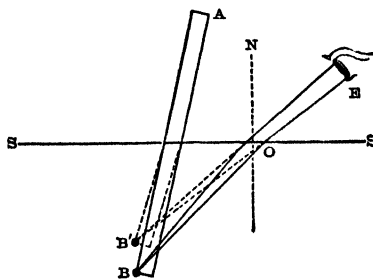


FIG. 2.

rays, B O, will be bent away from the normal after emergence, and will appear to the eye (E) of an observer as though they came from a point (B') in the water above B. The bottom of the pole will thus appear to be lifted up, and this will apply to all the points of the pole which are in the water. The final result, therefore, will be to give the pole the appearance of being suddenly bent at the surface of the water. When we view the bed of a clear stream, refraction causes it to appear higher up; hence clear water always looks shallower than it really is. When a ray of light passes through a prism, it is bent in its course away from the edge of the prism (Fig. 3), and the deviation (δ) produced is the angle between the incident ray A B and that which finally emerges, C D. This deviation is a minimum when the ray passes symmetrically through the prism—i.e., makes equal angles with the two faces of the prism. If a be the angle of the prism and δ' the minimum deviation, it can be shown that the refractive index (μ) of the substance of the prism is equal to

$$\frac{\sin. \frac{a + \delta}{2}}{\sin. \frac{a}{2}}$$

which result is of great practical importance in finding the refractive indices of many substances, the portion of minimum deviation being easily obtained. The use of refraction for obtaining enlarged images of minute or distant objects is

enormous, and for this purpose many forms of lenses are used. The effect of these upon light is more fully discussed in the article LENS. When light is refracted through most crystalline substances it gives rise to two different rays passing in different directions. This is known as the pheno-

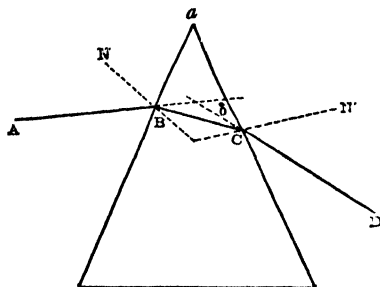


FIG. 3.

menon of double refraction. [POLARISATION OF LIGHT.] Although our most general experiences of refraction are obtained with regard to light, yet the phenomenon is exhibited by all kinds of radiation. The large waves of electrical disturbance have different velocities in different media, in the same way as have the minute waves of heat, and it is this difference of velocity which determines the phenomenon of refraction.

Refrigeration of a body is the loss of heat which it may undergo, its temperature being lowered in consequence. For a long time it was believed that rarefaction was alone sufficient to produce a lowering of temperature in a mass of gas, but it has been demonstrated by the experiments of Gay Lussac, James Prescott Joule and others that refrigeration will not be produced unless the gas expands against pressure—that is, unless it does work—and the loss of heat experienced is exactly equivalent to the amount of work done. Loss or gain of heat occurs when a body changes its state [LATENT HEAT], and this fact is practically employed in the artificial production of cold. Machines for the production of ice are known by the name of refrigerators, one of the commonest being that of M. Carré. Two strong metal cylinders A and B are connected by a metal tube, the whole being perfectly air-tight. Into A is placed a solution in water of ammonia gas. All the air is driven out of the apparatus, and the solution in A is heated, while B is cooled by running water. Ammonia gas is driven over from A to B, and soon condenses in B under its own pressure. After a suitable time, A is removed from the source of heat and is placed in cold water, while B is placed in connection with the water which it is required to freeze. This is suitably effected by having B in the form of a hollow jacket, capable of allowing a cylinder of water to be placed in its centre. As A cools, the ammonia is rapidly reabsorbed, the liquid ammonia in B volatilises, and thus seizes heat from surrounding bodies. The water in the central cylinder is the

nearest body to supply this heat; it thus becomes itself intensely cold, and hence freezes. In "cold-air machines" air is compressed by a pump, cooled to the lowest convenient temperature (generally by cold-water circulation), and then allowed to expand against the atmospheric pressure. In so doing it takes up an amount of heat equivalent to the work done, and hence cools the surrounding bodies. This method is used for cold storage on board ship, etc. Artificial cold is also often produced by means of freezing mixtures.

Regalia, ensigns of royalty which are displayed or used at coronations, such as crowns, sceptres, orbs, swords of state, the ampulla and spurs. The regalia of England are kept in the Jewel Room of the Tower of London; those of Scotland in the Crown Room of Edinburgh Castle. The term originally meant the prerogatives of the sovereign, being the plural of the Latin *regale*, "a royal right," also called *jus regale*. These include in Great Britain and Ireland the prerogatives of the administration of justice, of making war and concluding peace, of the right to unowned goods, of taxation, of minting and of supremacy in affairs ecclesiastical.

Regelation. [ICE.]

Regenerators are large chambers used with gas furnaces in order to make use of the heat which is carried away by the products of combustion and which would otherwise be lost. These gaseous products pass through chambers partially built in with bricks, and so heat these chambers to a very high temperature. The direction of the currents of gas and air to the furnace is then reversed so as to pass through this heated regenerator before combustion, while the gaseous products pass through another similar chamber. In this way the heat produced by the burning of the gas is greatly increased, and the application of these regenerators effects a very considerable economy in the fuel necessary. The idea of an engine which produced motive power by means of heated air originated with the Rev. Dr. Robert Stirling of Galston, in Ayrshire, who took out patents in 1827 and 1840; but the credit of the successful application of the principle and the invention of the most efficient type of furnace belongs to the brothers Werner von Siemens and Sir William Siemens.

Regensburg. [RATISBON.]

Regent, a ruler, especially one who exercises sovereign authority during the minority, absence, or disablement of the sovereign of a state. The most notable regents in British history are the Duke of Gloucester (1422-47) and George, Prince of Wales (1811-20), and in Scotland Murray (1567-70). The Protectors Somerset and Warwick in the reign of Edward VI. were members of a Council of Regency. At the old universities the term is applied to a resident graduate who takes part in the management of university affairs; but at Cambridge it is obsolete.

Reggio (ancient, *Rhegium*), capital of the province of Reggio di Calabria, Italy, on the Strait

of Messina, 8 miles S.E. of Messina. It is finely situated, having been almost entirely rebuilt since 1783, when it was ruined by an earthquake. The principal buildings are the cathedral and the municipal museum. The manufactures comprise silks, perfumery, byssus gloves, hats, gloves and olive oil. Founded by Greek colonists in the 8th century B.C., it was annexed to Rome in the 3rd century. Alaric (A.D. 410), Totila (549), and Robert Guiscard (1060) occupied it, and here Joseph Bonaparte was named King of the Two Sicilies. In 1860 it surrendered to Garibaldi, of whom the town contains a fine statue. Pop. (1901), 44,416.

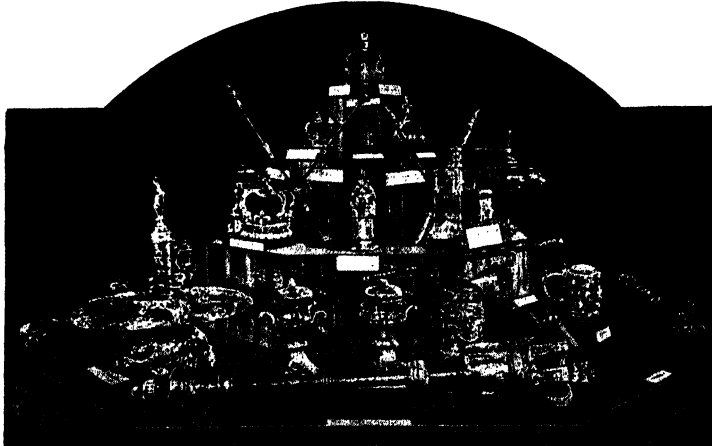
Reggio nell' Emilia, a town of the province of the same name, Italy, on the Crostolo, a tributary of the Po, 17 miles S.E. of Parma. As Regium Lepidi, it was probably founded by Æmilius Lepidus, the maker of the Via Æmilia. A republic from 1100 to 1290, it then fell into the hands of the D'Este family, but attached itself to Piedmont in 1859. The public buildings include the cathedral, the basilica of San Prospero, the Renaissance church of the Madonna della Ghiara with fine domes, the municipal palace, public library, museum, school of design, industrial institute and school of agriculture. The manufactures comprise textiles, brooms, leather, cheese-making and matches, besides printing and the rearing of silkworms. It was the birthplace of the poet Ariosto, of Secchi the astronomer and of the sculptor Prospero Clementi. Pop. (1901), 58,490.

of a regiment varies from about 500 to about 1,000 men; but the Royal Artillery constitutes one very large regiment divided—in the case of the British Army—into two distinct branches, (1) the Royal Horse Artillery and field batteries, and (2) the siege artillery, with heavy field batteries, garrison artillery proper and mountain artillery.

Regina, chief town of the district of Assiniboia and capital of the North-West Territories, Canada, 336 miles W. of Winnipeg. It contains the Government buildings and an Indian industrial school, and is the headquarters of the Mounted Police. Its interests are almost entirely concerned with the grain and lumber trades. Pop. (1901), 2,645.

Regiomontanus, otherwise JOHANN MÜLLER, astronomer, was born on June 6th, 1436, at Königsberg, Saxe-Coburg-Gotha. He studied at Leipzig and, after assisting Purbach in Vienna, he went to Italy, where he devoted himself to the study of Greek and the collection of Greek MSS. In 1471 he settled in Nuremberg, where, by the help of a wealthy patron, Bernard Walther, he built an observatory, in which he introduced several improvements in practical astronomy. Summoned to Rome by Pope Sixtus IV. to assist in reforming the calendar, he died there on July 6th, 1476.

Register, in music, a series of notes of similar quality produced in a similar manner within the compass of a voice or of an instrument: as the head register and chest register of a human voice, the *chalumeau* of a clarinet.



THE CROWN REGALIA IN THE TOWER OF LONDON.

(Photo: Pictorial Agency.)

Regiment, the largest division of an army which is permanently organised under its own special commander, who has the rank of colonel. Regiments are grouped into brigades, as may be convenient, and subdivided into squadrons (of cavalry) or battalions (of infantry). The strength

Registration, the entry in a book of statements or memoranda as to certain facts which serve as memorials or evidence of those facts. Some registers are public, and others, such as the registers of shareholders, mortgages, etc., required to be kept by joint-stock companies, are private.

The place or office where a public register is kept is called a registry, the act or system is called registration, and the officer who keeps the register is called the registrar. There is, as may be supposed, an almost infinite variety of subjects to which the system of registration is applicable; but undoubtedly the most important is that relating to births and deaths, which is now regulated by statute, but was formerly the subject of ecclesiastical cognisance only.

(1) *As to Births.* Every registrar is authorised and required to inform himself carefully of every birth which shall happen in his district, and to learn and register, as soon after the event as possible, such particulars as are required by the schedule annexed to the Births and Deaths Registration Act, 1874, to be registered touching such birth; and it is the duty of the father and mother of any child born alive—or, in their default, of the occupier of the house (if he knows of the birth), and of each person present thereat, and of the person having charge of the child—within forty-two days after the day of such birth, to give to the proper registrar information concerning such birth, and in his presence to sign the register. Where a period of three months from the birth of the child has expired registration may still take place; but in this case a solemn declaration before the superintendent-registrar as to the truth of the particulars required must be made by one of the persons on whom the statute imposes the duty of giving information as to the birth, and he or she must sign the register in the presence both of the superintendent-registrar and of the registrar of the district. But after the expiration of twelve months from the time of birth no registry thereof can be made except with the written authority of the registrar-general, and the fact of such authority having been given must be entered in the register.

(2) *As to Deaths.* A similar duty is cast upon the registrar of the district with regard to deaths, and it is the duty of the nearest relatives of the deceased present at the death or in attendance during the last illness—and, in default of such relatives, of any other relative in the same sub-district, and, in default of any such person present at the death, of the occupier of the house (if he knows of such death having taken place), and, in his default, of each inmate of the house, and of the person causing the body to be buried—to give to the registrar information (within five days next following the day of death), according to the best of his knowledge and belief, of such particulars as are required to be registered touching the death; and, in the case of an inquest upon the body, such information is to be conveyed to the registrar by the coroner before whom such inquest is held.

(3) *As to Marriages.* These may be said automatically to register themselves, since, whether the ceremony be religious or civil, the incumbent of the church or chapel, or the authorised official in other building, or the registrar must make duplicate entries of certain prescribed particulars in books expressly supplied for the purpose by the registrar-general, these entries being witnessed by two or more persons.

Four times in every year each district registrar is bound to deliver to his superintendent-registrar a certified copy of the entries therein, and finally the registry itself upon the book being filled; and at similar intervals the superintendent-registrar transmits the same to the registrar-general. The duties of the last-mentioned officer consist, in addition to the general supervision of the working of the whole system, in examining, arranging, and indexing the certified copies so sent. He has also to compile abstracts of their contents and send them once a year to a Principal Secretary of State, and they are afterwards laid before Parliament. The system was introduced in the year 1836.

Registration of Voters. In England the overseers of the poor publish, on August 1st, the lists which they have prepared containing the names and addresses of householders, direct or compound, who have paid their rates, and of lodgers who have already claimed for their votes. Publication consists in exhibiting the lists on the doors of churches, chapels, town halls and other municipal and public buildings (such as post offices in certain cases). Claims from persons who have been overlooked or otherwise ignored and objections to persons whose names are already included must be lodged on or before August 20th. It is important to note that, whereas the names of householders who are clear on the rate books go on the list automatically, lodgers must claim every year the date on or before which old lodgers must claim being July 25th (should they omit to do so they can claim as new lodgers up to August 20th). Revising courts are held between September 8th and October 12th, at which all disputed points, whether of claim or of objection, of omission or commission, are dealt with. The register so completed is then ordered to be printed and will come into force on November 1st for municipal elections and on January 1st for Parliamentary elections. In Scotland the lists, made up by the burgh or county assessors (or valuers), are published on September 15th, claims and objections must be sent in by the 21st of the same month and the sheriff holds his court to consider claims and objections between September 25th and October 16th, the register coming into force for all purposes on November 1st. In Ireland the lists are published on July 22nd, claims and objections are to be lodged by August 4th, and revision courts are held between September 8th and October 25th, the register coming into force on January 1st.

Regma, a term, of Greek derivation, implying splitting, occasionally employed by botanists for the superior schizocarpic fruits of such plants as the Mallow, Geranium, Tropæolum, Euphorbiaceæ and Labiata, in which the dry syncarpous fruit breaks, when ripe, so as not to disclose its seeds, either into its constituent carpels or into half-carpels. These segments are called cocci, nutlets, or mericarps, and there may be a carpophore between them or not. The regma differs from the cremocarp, such as the fruit of Umbellifera, in being superior.

Regnard, JEAN FRANÇOIS, dramatist, was born in Paris, in 1655, of a well-to-do family, and on the death of his father travelled in Italy, where he gambled a great deal. On returning from a second visit he was captured by corsairs and taken to Algiers, and was ransomed after some time by the consul. He subsequently travelled in other European countries, but in 1683 obtained a Government post and settled down to a literary career. His prose and poetical works were mostly of ordinary merit, but he shone as a writer of comedy, in which he was the successor of Molière. His masterpieces were *Le Joueur* (1696), *Le Distrain* (1697) and *Le Légataire Universel* (1708). He died on September 4th, 1709.

Regnault, ALEXANDRE GEORGES HENRI, painter, was born in Paris on October 30th, 1843. After obtaining distinction in his classical studies, he devoted himself entirely to painting and entered the studio of Lamothe, afterwards studying under Cabanel. In 1864 his picture of "Coriolan" attracted much attention, as also his painting of "Thétis" in 1865. In 1866 he gained the Grand Prix for painting and proceeded to Italy, visiting Florence, and finally settling in Rome, where he remained for two years making many illustrations for the magazine called *Le Tour du Monde*, and making studies for the pictures "Automédon domptant les chevaux d'Achille" and "Orphée aux Enfers." In 1867 he exhibited his portrait "La Dame en Rouge" in the Salon. In 1868 he went to Spain, where he studied Velazquez and painted a portrait of Marshal Prim, which the latter scornfully refused. The indignant artist left Madrid and exhibited this portrait at the Salon of 1869, where it created a great sensation. To this year belong his pictures "Alcazar de Séville," "Alhambra," "Toréador" and "Judith et Holopherne." In 1870 he exhibited his masterpiece "Salomé" at the Salon. The same year he painted "Exécution sans jugement sous les Califes de Grenade," some-

times called "Décapité." He then spent some time in Morocco, his travels in that country inspiring his "Départ pour la Fantasia à Tanger" and his "Sortie du Pacha à Tanger." On receiving news of the French army disasters in 1870, Regnault returned to Paris and joined a regiment of *francs-tireurs* and was killed in the battle of Buzenval on January 19th, 1871. He was an excellent draughtsman and a fine colourist and his work showed the influence of his study of the Spanish and Italian masters. In 1872 a general exhibition of his pictures was held; and the same year the students at the *École des Beaux Arts* erected a monument to him in the courtyard of that school.

Regnault, JEAN BAPTISTE, painter, was born at Paris on October 19th, 1754. In childhood he was taken to America by his father and became a cabin-boy on a merchant vessel; but a French artist discovered his artistic leanings and on his return to France placed him in the studio of Bardin. In 1775 he took the second and next year the first Grand Prix. In 1783 he was elected a member of the Academy of Painting, in 1795 he became professor at the *École des Beaux Arts* and in 1816 at the *École Polytechnique*. He was made a Baron in 1819. His masterpiece, "L'Éducation d'Achille," is familiar in engravings. Regnault died in Paris on November 23rd, 1829.



MARSHAL PRIM. (After Alexandre G. H. Regnault.)
(Photo: X, Paris.)

Regnier, MATTHURIN, satirical poet, was born at Chartres, France, on December 21st, 1573. He was a nephew of Desportes the poet and probably derived his poetical tastes

from him. His father did not approve of his verse-making, and, as he was not very amenable to discipline, he was despatched to Rome in the suite of Cardinal de Joyeuse. On the death of his uncle in 1606 he inherited a little property and, though he obtained ecclesiastical orders, led a dissipated life and died at Rouen on October 22nd, 1613. His knowledge of human nature is second only to Molière's among French writers.

His best-known productions are his brilliant satires. His works were published in 1608.

Regulus, the name applied to products obtained in the smelting of various metals, in which the ore has been treated so as to yield a richer substance—*i.e.*, one containing a higher percentage of metal. This regulus may then be treated directly for the extraction of the metal ore and again converted into another and richer "regulus" before the final extraction is performed.

Regulus, MARCUS ATILIUS, Roman hero, was sent to Africa in 256 B.C. in command of an expedition and conquered Tunis. Further victories crowned his arms, but at last he was disastrously defeated by the Carthaginians, under the Spartan Xanthippus, who kept him a prisoner for several years, finally sending him to Rome in 250 to offer peace, on the understanding that he should return if unsuccessful. He heroically recommended his fellow-countrymen to reject the terms of peace and returned to Carthage, where he suffered a terrible death. Some historians believe that the account of his death (and it has something of a theatrical look about it) was invented by the Romans to excuse their cruelty towards the Carthaginian prisoners.

Rehan, ADA, actress, was born at Limerick, Ireland, on April 22nd, 1860. She was educated at Brooklyn and New York, and made her *début* on the stage at Newark, New Jersey. Her success was immediate and she sustained the leading parts in Shakespearean and other tragedies and comedies to Edwin Booth, Laurence Barrett, John McCullough, John Drew and other actors. Amongst her most admired impersonations were those of "Katherine" in *The Taming of the Shrew*, "Rosalind" in *As You Like It*, "Viola" in *Twelfth Night*, and "Lady Teazle" in *The School for Scandal*. She excels in those rôles which give scope for the highest of animal spirits combined with the winsome and arch, with a touch of the pathetic, but all rendered with the most refined art.

Reichenbach, a town of Saxony, Germany, 50 miles S. by W. of Leipzig. Amongst the chief manufactures are those of woollens and cottons, and the industries include spinning, bleaching and the carding and dressing of wool. The public buildings include the Town Hall, museum and technical schools. Pop. (1900), 24,498.

Reichenbach, KARL, BARON VON, manufacturer and scientist, was born at Stuttgart, Germany, on February 12th, 1788, and studied at Tübingen. One of his first projects was to found a German settlement in the South Sea Islands, but this was nipped in the bud by his arrest and imprisonment at the order of Napoleon. He devoted himself to science, and discovered paraffin in 1831 and creosote in 1833, and became a great authority on meteoric stones. He also claimed to have discovered a new force, to which he gave the name of *od* and which—along with inquiries into psychical research and spiritualism—occupied the closing years of his life. He died at Leipzig on January

19th, 1869. He established factories in Moravia in 1815 and afterwards, made a large fortune, and in 1839 was created Baron by the King of Württemberg.

Reichenberg (Czech, *Liberec*), a town of Bohemia, Austria, on the Neisse, 55 miles N.E. of Prague. It ranks high amongst the Bohemian towns, owing its prosperity to the cloth industry, the yearly output exceeding a million sterling. Leather, gold and silver articles and musical instruments are also manufactured. The town, formerly part of the estate of Wallenstein, is largely owned by Count Clam Gallas, who has a fine castle here. The cathedral contains an altarpiece by Albrecht Dürer and among the public buildings are the Town Hall, the industrial museum and the textile school. Pop. (1900), 34,204.

Reichsrath. [AUSTRIA.]

Reichstag. [GERMANY.]

Reid, SIR GEORGE, portrait and landscape painter, was born at Aberdeen, Scotland, in 1841.



THE BISHOP OF SALISBURY (DR. JOHN WORDSWORTH).

(By Sir George Reid, R.S.A.)

He began his art training in 1854 by serving as an apprentice to a firm of lithographers in Aberdeen, in whose employ he remained for several years. In 1861, some lessons which he received from a travelling portrait-painter named William Niddrie made him anxious to study the finer branches of art. With this object he proceeded to Edinburgh, where he became a student at the Trustees' Academy, the well-known school of art. On his return to Aberdeen he painted a number of portraits and landscapes for small remuneration. His

first important portrait was of George Macdonald, the novelist and poet, and now hangs in Aberdeen University. In 1865 he went to Utrecht, where he studied under A. Mollinger, developing his talent under the guidance of that artist on somewhat unconventional lines. Owing to its originality, his work, for many years, received but slight favour at the hands of the Royal Scottish Academy, but eventually the soundness of his work began to tell and he was made an associate of that body in 1870, becoming a full member seven years later. In 1868, with the idea of strengthening his drawing, he took up his abode in Paris, entering the studio of Adolphe Yvon, the painter of history and pupil of Delaroche. He finally completed his art education under Josef Israëls at The Hague in 1872. In 1877 he exhibited a picture—"Gorse in Bloom"—for the first time in the Royal Academy in London. Although chiefly known as a master of the difficult art of portraiture, Sir George Reid has painted many landscapes of unusual power and beauty, like that of "Dornoch," now in Edinburgh, whilst of his delicate and artistic paintings of flowers, his picture of "Roses," exhibited in the Royal Academy in 1881, is perhaps the finest example. He has also done a great deal of landscape work in connection with black and white for book illustration, the most notable examples being his pictures in *The River Clyde*, *The River Tweed from Source to Sea*, *Royal Edinburgh* and other works. But it is as a portrait painter that Sir George Reid has achieved honour and distinction. His work in this direction is remarkable for its individuality of treatment and for its deep insight into and grasp of character, his subjects being always observed from a kindly point of view. Unlike his great contemporary, John S. Sargent, Sir George Reid is not concerned to astonish us with an amazing display of brilliant technique, but is content to keep the means subservient to the end. He is an excellent draughtsman and his colour is pure and fresh. His chief portraits, which are marked by a dignity and naturalness of pose, include the Marchioness of Huntly, Sir Bartle Frere (presented by the citizens of Cape Town to Lady Frere), Principal Tulloch, the Earl of Breadalbane, the Duke of Richmond, Professor Blackie, Professor Mitchell. D.D., of St. Andrews, Lord Mount Stephen, the Bishop of Salisbury and many others, especially in the Macdonald collection at Aberdeen. In 1891 Sir George was elected President of the Royal Scottish Academy, when he was knighted. This post he vacated in 1902, for reasons that were perhaps concerned with distaste for the ceremonial functions of the office, being succeeded by Sir James Guthrie. In 1900 he was awarded a gold medal at the Paris Exhibition, and in the same year the LL.D. of St. Andrews was conferred upon him. At the latter function Lord Balfour of Burleigh was installed as Chancellor of the University and Sir George's distinguished-looking presence was universally remarked. In days when the tendency of much of British Art was to become a weak imitation of Continental painting, the work of Sir George Reid was a conspicuous and highly necessary example of all that is best and individual in modern British Art.

Reid, THOMAS, philosopher, was born at Strachan, Kincardineshire, Scotland, on April 26th, 1710, and studied at Marischal College, Aberdeen. He took holy orders in 1731 and, six years later, was presented by King's College with the living of New Machar. This he held—at first not with too much acceptance—till 1751, when he became Professor of Moral Philosophy in Aberdeen University. In 1764 he published his most famous book, *An Inquiry into the Human Mind on the Principles of Common Sense*, which is thought to have won him the chair of Moral Philosophy at Glasgow, vacated in the same year by Adam Smith. In 1785 appeared his *Essays on the Intellectual Powers of Man* and in 1788 his *Essays on the Active Powers of Man*. He died in Glasgow on October 7th, 1796. Reid's speculations had been largely suggested by the writings of David Hume, of whose scepticism he was a strong opponent. Dugald Stewart, one of his pupils, wrote Reid's biography.

Reid, THOMAS MAYNE, novelist, was born at Ballyroney, county Down, Ireland, on April 4th, 1818. Educated for the Presbyterian Church, he gave up the ministry and emigrated in 1840 to the United States, where he led for years an adventurous life which supplied him with abundance of materials for his novels. He went through the Mexican war with great bravery, being severely wounded in the storming of Chepultepec (1847). Anxious to participate in the revolutionary movement in Europe, he left America in 1849, with the status of Captain, and found nothing but smouldering embers of revolt when he reached the Old World. Settling in England he produced a long series of excellent stories of adventure, the best of which were *The Rifle Rangers* (1850), *The Scalp Hunters* (1851), *The Boy Hunters* (1852), *The Forest Exiles* (1854), *The Quadroons* (1856), *The War Trail* (1857), *The White Chief* (1859), *The Wild Huntress* (1860), *The Maroon* (1862) and *The Headless Horseman* (1866). He died at Ross in Herefordshire on October 22nd, 1883, and was buried in Kensal Green Cemetery, London.

Reid, SIR THOMAS WEMYSS, man of letters, was born at Newcastle-on-Tyne, Northumberland, in 1842. He soon found his vocation in journalism and in 1870 became editor of the *Leeds Mercury*, a position he held till he was appointed general manager to Cassell and Company, the publishers, in 1887. While filling the editorial chair he found time to write two novels, *Gladys Fane* (1883) and *Mauleverer's Millions* (1886), besides a book on *Charlotte Brontë* and other works. In 1888 he published the standard *Life of the Right Hon. W. E. Forster*, which was followed by the *Life of Richard Monckton Milnes, 1st Lord Houghton* (1891), the *Life of Lord Playfair* (1899) and the *Life of William Black* (1902), while he also edited the popular *Life of W. E. Gladstone* (1899). In 1890 he was instrumental in founding *The Speaker*, which he conducted until 1899. In 1893 he became LL.D. of St. Andrews University and, in the following year, received the honour of knighthood "for services to letters and politics," Lord Rosebery being then Prime Minister. He was President of the

Institute of Journalists in 1898-9. He died in London on February 26th, 1905. Shortly after his death the first portion of his *Reminiscences* was published.

Reid, SIR WILLIAM, soldier and colonial governor, was born at Kinglassie, Fife, Scotland, on April 25th, 1791, and educated at Musselburgh and Edinburgh Academy. Joining the Royal Engineers, he served throughout the Peninsular War with conspicuous gallantry and afterwards took part in the somewhat futile campaign in the United States in 1815 and in the bombardment of Algiers in 1816. From 1824 to 1827 he was engaged on the Irish ordnance survey, and his presence in the West Indies in 1831, then devastated by a hurricane, provided him with an opportunity of studying the whole question of tempests. These labours were interrupted by service in the Spanish Legion in connection with the Carlist War, but his book on *The Law of Storms* was published in 1838 and next year he was elected F.R.S. In 1839 he was appointed governor of the Bermudas, where his rule was so beneficent the people called him the Good Governor. Being transferred in 1846 to Barbados, as chief governor of the Windward Islands, his administration promised to be equally able and benign when some arbitrary procedure of the Colonial Office led him to resign office in 1848. In 1850 he became chairman of the executive committee of the first Great International Exhibition and in 1851 was created K.C.B. Later in this year he was appointed governor and commander-in-chief at Malta and conducted affairs (including the trying period of the Crimean War) with unostentatious excellence. He died in London on October 31st, 1858.

Reigate, a town of Surrey, England, 6 miles E. of Dorking. The name is said to be a contraction of Ridgigate, "the pass through the ridge of the North Downs." Lord Howard of Effingham, the English admiral opposed to the Spanish Armada, was buried in a vault on the south side of the chancel of the church of St. Mary Magdalene. The public buildings include the Town Hall, the grammar school and the public hall. The Red Cross Inn occupies the site of an ancient chapel and part of the walls of another old chapel adjoin the White Hart Hotel. Under the keep of the castle, which was nearly all destroyed in 1648, are the Barons' Cave and a vault 150 feet long and 10 feet high. The grounds of the castle have been laid out as a public garden. In the vaults beneath the garden, which were excavated for sand, various kinds of fungi grow profusely. The bed of white sand on which the town stands has been found very useful in gardens and nurseries and in the manufacture of glass, and freestone and hearthstone are also procured in the vicinity. Reigate is a favourite residential quarter with London business men and many handsome villas have been erected. Pop. (1901), 25,993.

Reindeer (*Rangifer tarandus*), the sole species of its genus, from the northern parts of Europe, Asia and America (where it is called the Caribou).

In prehistoric times it ranged as far south as France, and gave its name to a period and to tribes living in that period. Down to the middle of the 13th century it lingered in Caithness. The size is about that of a red deer, but the wild race is larger than the domestic, attaining its greatest size in Spitsbergen (where it is growing scarce), Lapland and Finland. It thrives in Iceland, where it has been introduced. The colour is a brownish-grey, and the hair becomes thicker, lighter, and longer in winter. Both sexes bear antlers, variable in shape; there is a bezel time as well as a brow time, both either branched or palmated. In the caribou and in some English fossil forms the brow time on one side is generally aborted so as to allow free development to that on the other. The muffle of the nose is covered with hair and is not moist. In a wild state these animals are gregarious. In summer they



REINDEER.
(*Rangifer tarandus*.)

feed on the shoots of willow and birch and in winter upon lichen, to obtain which they scrape away the snow with their hoofs and antlers. The wild reindeer is shot and trapped for its flesh and hide; and the domestic form constitutes the chief wealth of the Laplanders. It is employed as a beast of draught and burden, and when dead nearly every part is utilised.

Reindeer Period, a term applied by M. Lartet in 1863 to the close of the Palaeolithic age, or a period intermediate between that and the Neolithic age, when the reindeer abounded in the south of France, together with mammoth, Irish deer, cave-lion, and marmot, as evidenced by their remains in the caves of Dordogne, Périgord, Aude and Mont Salève. Flint implements occur in these caves—less rude than those of the Abbeville (St. Acheul) type, but not ground or polished—well-shaped bone-needles, and various incised drawings on bone, but no metal objects. The climate seems to have been colder than it was in the period of the Swiss Lake Dwellings.

Relapsing Fever, or FAMINE FEVER, an infectious disease, in which an attack of high fever occurs. This usually lasts about seven days; the temperature then falls, and at or about the fourteenth day of the illness a relapse takes place, the temperature again becoming raised. There is sometimes a third relapse. The disease is closely

associated with starvation and conditions of overcrowding. It has manifested itself in many parts of the globe; it is rare in England and Scotland, but has committed considerable ravages in Ireland. A micro-organism, the *Spirillum Obermeieri*, has been detected in the blood of persons suffering from the disease. The mortality averages about 5 per cent.

Relics are of three kinds: the bodies, or parts of the bodies, of the venerated dead; things used by them or connected with their martyrdom; things hallowed by contact with their bodies. The respect properly due to the remains of the first confessors of Christianity developed into adoration, against which Augustine protested. Jerome defended the custom and, although he declaimed against the idea of worship, allowed that miracles were wrought by relics. The rage for their possession became excessive and in the Middle Ages they were the objects of a scandalous traffic. Costly reliquaries were set on the altars to contain them. Their miraculous powers were defended by instances from Scripture, as recorded in 2 Kings xiii. 21. While leading Roman Catholic writers do not dispute the non-authenticity of many relics and the *Roman Catholic Dictionary* (1884) allows that "abuses no doubt have occurred in all ages," a rule of the Roman Catholic Church requires that in a cavity called "the tomb" every altar must contain an authorised relic as a condition of the celebration of the Mass. The instinct is laudable and is not confined to religion. The sword of Sir William Wallace or the clothes worn by Lord Nelson when he received his death-wound can never be viewed with indifference by those who love their country and even a nature so callous as Napoleon's had a profound belief in the effect of relics upon the imagination.

Relief, in feudal law, a fine which was paid to the lord by the heir of a tenant on his death, for the privilege of succeeding to the estate.

Relievo, or **RELIEF**, in sculpture, the term applied to the projection of a figure from its background. As a rule, there are three degrees of relief, namely, high relief (*alto rilievo*), in which half of the figure may project, of which the Elgin Marbles are the classic example; low relief (*basso rilievo*; *bas-relief*), in which the figure projects slightly, as in the Assyrian sculptures; and middle relief (*mezzo rilievo*), in which there is a moderate amount of projection, about intermediate between the other two kinds.

Religion (Latin, *religio* or *religio*), a term used, not only in English, but also in a great number of European languages, and in the most widely divergent senses, for that which is involved in the attitude of men towards the Unseen. It may include—and this is probably its most appropriate usage—the whole theory of that which lies outside the sphere of the senses in so far as it is regarded as personal and exercising power or authority; or at the other extreme it may be narrowed down to include only the body of belief held by a particular religious community. "When I

mention religion," says Thwackum in *Tom Jones*, "I mean the Christian religion, and not only the Christian religion, but the Protestant religion, and not only the Protestant religion, but the Church of England"; so again, as we find in history repeatedly, the adherents of one body of doctrine have described their opponents as *ipso facto* irreligious. The word, therefore, varies from the broadest sense of the theory of the Supernatural to that of Theology or even the concrete body of dogma of a single sect. Thus it comes to pass that while few people would confess ignorance as to its meaning, there is no single definition, wide or narrow, which would meet with anything approximating to unanimity of approbation. Sir J. R. Seeley, in his *Introduction to Political Science* (1896), shows in a trenchant passage that the word "liberty" may mean, for example, "not being in prison," or it may be narrowed down to "having something to eat." So it is with "Religion."

It must further be remembered—and the very obviousness of the fact leads us often to forget it—that the word is of Latin origin, and, therefore, very much younger than the idea or ideas which it denotes. Even among the Romans there was considerable doubt among learned authority as to the real meaning of the word. Cicero derived it from *relegere*, "to gather," "collect," "reiterate," and explains it as the dwelling upon or pondering over sacred things. But others tell us that it comes from *religare*, "to bind," and denotes the whole body of thought and action which comprises the bounden duty of the believer. The former may be taken to emphasize the importance of right action, obedience to form and ritual; the latter includes also the correctness of man's attitude to Divine existence and authority. The present, however, is not the place to discuss the relation to "Religion" of words like "Theology," "Dogma," "Belief" and the like. Our purpose is rather to investigate the origin and development of what may be called the religious instinct, and briefly to trace its manifestations in various stages of human development. The subject is of far more than academic interest and should commend itself to all serious men not only for its intrinsic value as an educative force and for the stimulus it affords to solid religious conviction—for who can honestly proclaim his creed without some knowledge of those beliefs which others have held and he excludes?—but also for its incalculable importance to citizens of a great governing Empire who are called upon to understand, and, in some measure at least, to direct the administration of millions of men whose religious beliefs are as divergent from their own as are their social conditions, their climate and their history.

Methods of Study. It follows that the word "Religion" is here understood in the wide sense roughly indicated at the beginning of this article. How did mankind begin to believe in the existence of powers or beings, unlike his fellows in so far as they were to some extent at least outside the sphere of sense-perception and the ordinary conditions and limitations of human

existence? This is the problem. How must it be approached?

In the first place it must be clearly understood that the science, as we call it, of comparative religion is to all intents and purposes a new subject of study. Rudimentary attempts were made as far back as Herodotus and Plato, and in all periods travellers have noticed, and to some extent theorized about, the rites and beliefs of the peoples among whom they have lived. But a properly co-ordinated study of the evidence, and indeed the systematic collection of that evidence, are recent phenomena. Roughly speaking there are two methods of study, which we may distinguish broadly as the *introspective* or *theoretic*, and the *experimental* or *historical*. The former consists in arguing back from developed religious belief to that which seems to be its ultimate basis; thus Thomas Hobbes (1588-1679), the famous philosopher and translator of Thucydides, and David Hume (1711-76), the historian and philosopher, reduced all religious emotion ultimately to the fear of things unseen. The latter method consists in (1) the observation not only of developed beliefs and what are called the "higher religions," but also of rites and beliefs of present-day savages, (2) the comparative study of ancient documents written or graven on stone and metals which describe the religions of Greece and Rome, Egypt, Assyria and Babylonia, (3) the investigation of the names of deities in ancient and modern languages, and (4) the collection of actual remains, architectural, artistic and the like, which testify to the ceremonial practised by those who made them. This method, though for want of data as to pre-historic ages its scope is limited, is incomparably more practical in its results. It makes use of all the great branches of science: Anthropology and Ethnology, Philology and Archaeology, Geography and History in their widest senses, all contribute their results. And of late years even physical science has begun to take its share by investigating the actual structure of the brains of savages, children and the lower animals. The short-sighted, though in its day perfectly intelligible, opposition of orthodox theologians has in great measure given way to a more tolerant attitude, and men have ceased to regard as blasphemous the idea that the growth of religious ideas can be traced as scientifically as that of physical form and structure. The authority of the Christian Revelation is in no way affected by the belief that the cults which preceded it developed in a perfectly coherent manner from the most primitive periods of life on the earth, and from perfectly intelligible causes—such indeed as may be seen in operation among children and the more primitive savages of to-day. Finally, the study of the evolution of religion belongs in some degree also to two main branches of philosophy, metaphysics and ethics. The former investigates the ultimate nature of being and not-being, the spiritual and the material, cause and effect; the latter considers the history and authority of moral laws. These aspects need not further be discussed here, but it is of the utmost importance that the student should understand that the ethical or

moral aspect of religion belongs to a very late stage in its history, and that the deities of primitive man are in no way moral rulers, nor are the services paid to them in any way based on moral laws. We have now considered the definition and content of the subject, and also the method of the science of Comparative Religion. We must now turn to the problem of the origin of religious belief.

Primitive Man. This term, though very generally used, is unsatisfactory, and its use has led to highly illogical conclusions. In the first place the earliest human beings who have left distinguishable traces in the form of implements, etc.—*i.e.*, the men of the Palæolithic age—were already to some extent civilised. Assuming that there ever was a point of time at which humanity began, we know, and can know, nothing of it. Secondly, the term as applied to the least developed savages of to-day is similarly unsatisfactory, inasmuch as even these men are not strictly "primitive." The term must, therefore, be understood to apply roughly to the men of the Palæolithic age and to those savages who are to-day approximately at the same stage of civilisation. But in the second place, even if we could go back to the first human being, we should still fail in completeness if we did not study certain phenomena in the animal world as a whole, and in children. The old idea of man as distinguished from the lower animals by the possession of rationality is entirely false and has been exploded with the growth of knowledge, and it is possible to gain from the observation of a dog in the presence of facts which it cannot understand a very clear idea of the behaviour of the truly primitive man in similar circumstances.

The most generally accepted theory of the origin of religious belief is that some form of it is inherent in all men from the first, and that the earliest idea was that of a single being far above men and all other existence, *i.e.*, monotheism. Now these two views are based partly on inferences from the higher religions, and partly on observations of primitive men, *i.e.*, the lowest savages we know, and are, in so far, unsatisfactory, as we have seen. But there is this further objection that the view as stated by the most authoritative writers suggests a stage in mental development distinctly in advance of that which those writers describe as the animistic stage which gives birth to polytheism. The fact that, for example, a Samoyede speaks of the sky-god, Num, as too far away to be accessible to the worship which he pays to other gods, and that a similar deity exists in nearly all primitive savage cults, is one which indeed demands explanation. It is by no means a natural primitive idea, but must be supposed to have been evolved by members of a society in which there are many chiefs in obedience to one king, who cannot be approached by the common people. In a word, a divine hierarchy can scarcely have been imagined save by those who had experience of a social hierarchy. Since those who believe in such a god are not primitive in a real sense, clearly the god Num, for instance, is not really shown to be prior to the minor gods. These generally accepted

views may be true, but the evidence on which they are based is certainly insufficient.

Animism. Let us, therefore, endeavour to consider the actual mental position of the savage. In the first place, he is faced by an enormous variety of circumstances, many of which he cannot understand. By experience he finds himself able to control some of these circumstances; in some cases, *e.g.*, the moving of a small piece of wood, his will issues directly in action, and opposition is practically absent. He observes his fellows performing similar actions and he knows their objects and intentions by exchange of words and partly by inference. In some cases his will conflicts with theirs, in others he and two or three others will succeed or fail in an action which others oppose. He is not conscious of laws, psychological or physical; yet he is gradually making such laws for himself by experience. In precisely the same way he is pleased or displeased, assisted or hindered, by natural forces—the sun, which warms or parches him; the river, which quenches his thirst or sweeps him away; the stone with which he kills his enemy or is himself wounded—to all of which, in the absence of a modern text-book, he adopts the attitude which he and his fellows adopt to one another. He credits his fellows with having those emotions and intentions which he knows he has himself, and acts accordingly. Very naturally he attributes to these natural forces the very same emotions and intentions. The rock which crushes his foot has a malign purpose to injure him, just as his human enemy tries to kill him. The rock is, therefore, a living thing; so are trees, mountains, rivers, the sun, the moon and the stars. This stage is generally known as Animism, from the Latin *anima*, “spirit.” It is a satisfactory term, provided always we do not understand it as signifying that the animistic savage has any idea of what we call “the supernatural.” The rock is to him a being just like himself and his fellows, except in outward form. In passing, we may notice how infinitely more simple is this idea than that of the alleged original god in the generally accepted primeval monotheism. If instinct or revelation had from the beginning taught the savage this one god, is it credible that he would be found, as is actually the case, in this elementary stage which we have agreed to call Animism? Obviously he has no real idea of the supernatural or even of personality, such as the monotheistic conception involves.

Origin of Worship. In the face of human opposition, the savage has learned that several courses are open to him. If he is the stronger, he kills his opponent or compels him by force and threats to obey his will; if he is the weaker he finds it advisable to propitiate his enemy by concessions, prayers, and flattery. Naturally then he adopts these methods in relation to the rock or the river; for example, if he can, he breaks the rock with his axe; if he cannot, he tries to placate it as he would placate his human enemy; according to the degree of his power and his fears, his attitude varies. In point of fact in the majority of such cases the paramount feeling is naturally helplessness in the

face of hostility and half-understood power—the “fear of things invisible” (Hobbes). On the other hand these forces sometimes helped our savage, *e.g.*, by exerting their hostility on his enemies. In these cases, just as he had found it prudent to pay court in the form of flattery, gifts, and obedience to his powerful human ally, so he endeavours to secure the permanent friendliness of the rock (not as yet the rock spirit) by acknowledging his inferiority and his indebtedness in a manner which he conceives of as likely to be lucrative and well-pleasing to the rock.

This attitude of mind on the part of the savage must be clearly understood, partly in order that we may not be misled by the analogies of modern terms and ideas into crediting primitive man with conceptions which belong to later stages in mental development, and partly in order that we may arrive at a satisfactory theory of the basis of religious belief. A great many writers have protested against attributing all religious ideas ultimately to fear, and have pointed to the fact that, as we have said, the forces of Nature were not only harmful but benignant. The objection is rather trivial, inasmuch as the gratitude of the savage is always expressed in terms which indicate rather a lively sense of the possibility that the beneficent influence might be discontinued, than profound confidence in a trusted friend. At the same time it is undoubtedly more accurate to describe the root idea as one of business-like self-interest, based on a purely practical appreciation of the conditions of life combined with complete ignorance of the laws by which they are governed. It is indeed a sort of insurance system against death and accidents of every kind, an attempt to provide armour, offensive and defensive, against superior power, whether of men, animals, or things.

We have seen that up to this point there is no idea of the supernatural, no real worship as distinct from homage paid to physical strength. The next stage is, however, a very simple one. Having arrived at the idea that all objects are to all intents and purposes alive, the savage proceeds to classify. Thus, from the notion of all rivers possessed of will, likes and dislikes, he advances by a process of abstraction to that of a spirit governing, and separable from, all rivers.

This advance is a perfectly natural inference from the social conditions under which he lives, a community governed by a king and subordinate chiefs. It is aided also by analogies of the phenomena of human death, wherein the material body is in some sense deserted by the spirit. Thus there is a spirit of the wood which may transfer itself from tree to tree, and hence a hierarchy of tree-spirits. Again the spirit of the sun or the moon is regarded as greater than those of less formidable and less distant objects, which were in various degrees under the control of man. Hence arises a graduated polytheistic system, such as we find in various stages of development among various peoples to-day. The process from animism pure and simple, to the elaborate pantheons of India, Greece, Rome, may be divided into three stages:—

A. With the progress of knowledge objects are

classified naturally, and there arises the idea of a single spirit governing the whole class.

B. These governing spirits become more and more separated from the individual objects, and begin to emerge as representative or departmental gods.

C. These gods are arranged on the analogy of human society in a hierarchy or pantheon, ruled by a single god (*e.g.*, Jupiter of the Romans, Zeus of the Greeks).

It is important to notice that this process of generalisation is the first attempt at scientific knowledge, and its form is precisely that of modern experimental science, from the individual facts to generalised laws, from the infinite number of products to the one ultimate cause.

Throughout this process animism persists. Indeed, among the most highly developed peoples there are very obvious traces of it, if only in forms of speech and metaphors generally. Sailors whistle for the wind, the tree is said to groan, Xerxes cast fetters into the Hellespont, the Greeks punished inanimate objects which had caused a man's death, Canute (Cnut) forbade the tide to rise, and so on. This perseverance of animism is the explanation in various ways of the universal beliefs in evil demons, magic, and the lower types of fetiches—in fact of the whole army of mysterious powers which war against the higher gods.

We have thus arrived at a stage when we can reasonably speak of worship paid to distinctively supernatural beings, and we have seen generally in what sense the universal existence of animistic beliefs is at the root of all kinds of so-called religious development. It may seem that very little evidence has been given for conclusions so important and far-reaching; this is due, not to the lack of such evidence, but to the limits of space. The student will do well to study such works as are quoted in the bibliography at the end of the article; there he will find evidence which is in the first degree relevant and also is drawn from so large an area of history as to be practically conclusive. It is now necessary to proceed to sketch rapidly the various forms which animism assumed in its progress from simplicity to the elaborate religions of Egypt, India, Rome and Greece, and to the complex, mysterious and often repulsive cults of the so-called "lower races" of mankind. And first we come to Nature Worship in general.

Nature Worship is practically Animism *plus* Classification *plus* Worship; it is the nearest to animism, and covers the two stages described above as A and B. All the chief objects in nature have received and, indeed, still receive worship. (1) Thus the Earth itself as a whole is worshipped as the universal Mother, giver of life and food. The ancient Germans buried food as an offering to the Earth-goddess Hertha; the tribes of North Asia, the Aztecs, the Peruvians, the Romans, the Greeks, the Anglo-Saxons have all, from the earliest period of agricultural humanity, seen in the earth the parent of all things living. From this we advance to the innumerable, often revolting, forms in which fertility, animal and vegetable, has been worshipped the world over. So the

Hindu believes that the earth is annoyed at being scarred and torn by ploughing; so the future safety of a new building is attained by burying a victim in the foundation. A development of this idea is found in the array of special "mothers": the rice-mother (India), corn-mother (all over Europe, ancient and modern), maize-mother (Peruvian *sárāmānā*). (2) The spirit of the *heavens* as a whole is worshipped as the universal parent by the North American tribes, the Samoyedes, the Finns. (3) The *sun*, again, is the father of all in virtue of the vital warmth and light which he gives; indeed, some writers have regarded sun-worship as the real source of all the mythologies of the world ("solar myths"), and have said that to primitive man the greatest phenomenon was the sun-rise. (4) Analogous to sun-worship is the cult of *fire*, which also is almost universal among the lower races, and appears in the symbolism of such higher cults as those of the Parsees, and the Græco-Roman Hestia or Vesta, the hearth-goddess of state or family. This worship is an example of the complex elements which enter into a single idea; thus fire is, physically, the source of warmth and comfort; it is also in the social scheme the centre of family life; again, it has cleansing properties (*cf.* the burning of the sacrificial offerings); or again, it is a great destroying agent. (5) The worship of *stones*, though less widespread, is interesting for two special reasons, firstly, because there is no symbolic meaning in many of the cults, and secondly, because in many typical cases the shape of the stone is not such as to suggest the worship in question. Thus the Cybele stone which was brought to Rome from Asia Minor, when the Phrygian cult of Cybele became prominent, was "a small black stone, rough and unhewn," just as the granite boulder, which the modern Basuto worship. Similar objects are venerated by peoples in South India, by the Dakotahs, and by the Melanesians whose worship, however, is in some degree influenced by the shape of the stone. Sir Alfred Lyall tells of a Hindu officer, "of great shrewdness and very fair education, who devoted several hours daily to the elaborate worship of five round pebbles which he had appointed to be his symbol of Omnipotence"; here, of course, symbolism is present. Allied to this rude stone worship is that paid to cromlechs and to pillars of phallic type, which are regarded as influencing the fertilisation of women. (6) *Tree-worship* is practically universal, and is traceable perhaps partly to the age to which trees attain as compared with seed-crops and other vegetables, partly to the movements and sounds they make when the wind blows, and partly to the idea that the gods, disturbed by the spread of cultivation, had sought the peaceful darkness of the woods and groves. In Greece and Rome respectively we find Dionysius and Iuppiter Feretrius worshipped in single trees; Scandinavian tradition tells of Ygdrasil, the universal life-tree. The belief held by the Kharwars and Mundaris (of Bengal), certain African tribes, etc., that the spirit of the trees can give a good harvest is paralleled by the refusal (for various reasons) of the Ojibways, the people of Berar, the West Indian Negroes, to maim or cut

down a living tree. We must now, however, pass over innumerable cults and sub-cults (*e.g.*, of water, mountains, moon and stars), and come to the subject of Animal Worship which is, for various reasons, a thing apart.

Animal Worship. Since every animal was either dangerous or useful to mankind, it is not surprising that each has been the object of worship; each locality deified its own fauna. Everywhere mankind has worshipped serpents; in Egypt we find the cult of crocodiles (and in Madagascar), the sacred bull, the cat; the Samoyedes worship the polar bear; birds, fishes, even insects have had their worshippers. The worship paid to animals has, however, taken a very curious form which has greatly puzzled students, and is not satisfactorily explained. This form is *Totemism*. It has been traced to the early animistic belief that the soul of a man, which can at will leave the body during life, passes at death into some other body, *e.g.*, into that of an animal. J. G. Frazer defines "Totem" as "a class of material objects which a savage regards with superstitious respect, believing that there exists between him and every member of the class an intimate and altogether special relation." These totems are generally classes of animals, though plants also are found in this connexion. They are of three kinds, class, sex, and individual totems, and are to be distinguished from fetishes, which are individuals, not whole classes. Among the laws attaching to this belief are that a man may not, except on special sacred occasions, kill or eat any animal of the totem class, and that there must be no intermarriage within the totem sept or sub-class. Both these laws are based on the idea of peculiar kinship subsisting between the totem animals and the members of the sept. In general the totem is regarded as the tribal ancestor (*cf.* the turtle class of the Iroquois, who claim descent from a very fat turtle which was driven by the stress of its own weight to cast its shell, and so developed into a man), who, as the totem feeling vanishes, gradually becomes a self-existent creative deity either in the form of the animal or in a human form accompanied by the type-animal as attendant. It seems probable that the system, through which all peoples have passed, originated in the necessity of establishing some basis of friendliness between dangerous animals and primitive man, coupled with the all-pervading idea that such animals were animated by the common humanity, so to speak, which was everywhere recognised. The totem must be distinguished from the *manitou*, *naqual*, or *paoarissa*, which is an animal adopted as his particular "familiar" by each youth (of the North American Indians, Guatemalans, etc., Peruvians, Zulus) on attaining puberty. The same respect is paid to this animal as to the totem, but not to all animals of the same class; nor does the connexion descend to the heirs after the individual's death.

Fetishism. We come next to an important subject which, like Totemism, has given rise to the most widely different theories. The word was introduced into scientific terminology by Charles de Brosses, and is derived from the Portuguese *fetico*, a charm or amulet. By a very rough

analogy this term was originally applied by Portuguese sailors apparently to any object which they saw worshipped by the West African natives. Thus we find in Purchas's *Pilgrimage*, in a chapter translated from a Dutch original, frequent mention of *fetissos* and so-called *fetisseros* (*i.e.*, priests). De Brosses, followed by Auguste Comte in his *Philosophie Positive*, took the word in a very wide sense, which is now known to be incorrect, as covering the worship of natural objects in general for the power which they were able to exercise of themselves; not unnaturally he proceeded to derive all religious belief from fetishism so understood. We have seen, however, that the earliest forms of religion are animistic, *i.e.*, based on the idea that there is spirit in all things; thus fetishism is not an ultimate belief, but a derived and degraded form of animism, or, in other words, the fetish is regarded merely as the dwelling-place or medium of a controlling spirit. Subsequent research has shown that not even the most primitive Negro believes in a fetish without a spirit or in such an object as exerting power of itself. E. B. Tylor therefore describes fetishism as "the doctrine of spirits embodied in, or attached to, or conveying influence through certain material objects." The differences of opinion which have existed and still exist may be seen by comparing with Tylor's definition that of Lord Avebury (Sir John Lubbock) in his *Origin of Civilisation*. Fetishism is there described as the "stage in which man supposes he can force the deity to comply with his desires." As we shall see later, such a definition practically identifies fetishism with magic, and it is better, in view of the evidence we have, to differentiate the two. At the same time it is perfectly correct to regard fetishism as a link in the chain by which religion develops from simple animism to the complicated stage generally stigmatised as magic, and in general to the worship of idols.

The fetish is an ordinary material object, natural or artificial, which has no particular characteristic, and generally is intrinsically of small or even no value. (The word is still used in so many senses that many examples quoted by one authority are ridiculed as irrelevant by another. The subject is as nebulous as it is interesting. From the early connexion with Africa the term is even used by some authors for Negro religion as a whole.) In contrast to the great gods of the family and the community it acquires its peculiar sanctity in an unofficial, or in modern terminology an "unorthodox," way. Thus the Negro of the Gold Coast who desires a fetish of his own (*suhman*) takes the object which he prefers, and, after preparing in certain ways, calls upon a Sasabonsum, or malicious deity, to send a spirit into it. Henceforth he regards this spirit as his familiar; he expects it to give him assistance, generally against his enemies, in return for suitable offerings. We thus see the beginning of the desire to compel the spirits to do the will of men, which is characteristic of Magic as opposed to the higher forms of Religion. Or, again, as we find in other parts of the world, the savage may select any object which strikes his fancy, and promise to regard

it as a holy thing if the project on which he is for the time engaged proves successful through the aid of its spirit. If the enterprise succeeds, he pays to the object a veneration which is analogous to that described in the previous example in so far as there is present the idea that the spirit has been constrained by the worshippers. It has been stated by some authorities that, in the event of failure then or subsequently, the fetish is treated with contumely by the worshipper; this is, however, denied on the ground that the Negro is too much afraid to risk any display of anger or disrespect, and it is held that the utmost daring of the owner of a fetish is bounded by urgent entreaty and bribery. The most we can profitably maintain is that fetishism represents an ill-defined stage at which the savage is dimly conscious of his power over surrounding objects (this is confirmed by the fact that fetish objects are, as we have seen, of slight value), differentiating the greater from the lesser spirits, and is vaguely and unconsciously cynical in his attitude to the latter. A few characteristic examples must serve to illustrate this wide-spread form of belief. (1) In the districts south of the Congo, the spirit resident in the fetish is sometimes that of a human being. In these cases the priest takes a number of Negroes into a wood, and, having cut or carved a rude semblance of a man in wood, mentions the name of a selected person. It is believed that the person dies in less than ten days, and that his spirit then enters the fetish. (2) In many districts a dead body is preserved in the belief that the spirit occasionally returns to it; or again a limb, or even a lock of hair, or a former possession of the dead man is regarded as sufficient for this purpose. A stone lying on the grave or a twig from a tree growing there is regarded by some of the Slav peoples as the abode of the spirit. The fact that the relic is merely a medium or "god-home" is here incontestable. (3) Among the American Indians the skin or some other relic of a *manitou* is regarded as the haunt of the whole spirit of the dead animal and as exerting an influence over the fortune of its possessor no less than that of the *manitou* when alive.

Magic. It is easy to see how this kind of belief (1) had its roots in Animism, and (2) how it gradually degenerates into sorcery, witchcraft or, in a word, Magic. The fetish, as the abode of the spirit, becomes the mere charm or amulet with its own power to protect, with which we are familiar in the form of "superstitions," like that of putting a poker over the fire at right angles to the grate to make the fire burn, or making the symbol of the cross on bread before it is put into the oven. The spirit has ceased to be a mysterious power; it is practically nothing but a mechanism for producing a given effect.

The ultimate distinction, if such there be, between Magic and Religion proper is not easily drawn. Some of the attempts which have been made savour of a determination to find such a distinction rather than a difficulty in finding words for a clear mental idea. It is impossible here to

discuss the attempts; it must suffice to collect a few salient characteristics. In the first place, it is quite unnecessary to postulate a difference in origin between Religion and Magic. Both are explicable equally well on the assumption of primitive Animism. In the second place, while it is easy to draw various distinctions between the two, there is a large area common to both, and there are throughout elements of the one in the other; especially is this true of the magical element in Religion. It is generally held that one difference consists in the fact that whereas in religion the worshipper prays for help to the great gods behind Nature, the magician forces the hand of Nature itself. This distinction obviously is not fundamental; the two phenomena represent different stages in the same mental evolution. We have seen that the animistic stage moves upwards from the idea of spirits in all things towards a hierarchy or pantheon of deities; clearly, therefore, the lesser spirits (*i.e.*, local spirits and those which belong to inferior objects) approximate more and more nearly to man, until by comparison with the greater gods they become as it were the "menials" of the celestial household, and as such are progressively less alarming and more subservient to human will. In other words, the greatness of the great gods increases in proportion as that of the lesser diminishes.

Moreover, we are here concerned with new factors of great importance, namely, the personal element, as shown in the power claimed by those who came to be regarded as more closely than others in connection with the gods (priests or sorcerers), and in the relations of conquering peoples and those of superior intelligence respectively to conquered peoples and those of inferior culture. In other words we see the beginning of "Authority," of a conflict between orthodoxy and heterodoxy or "paganism"; between priest and layman, almost between a State Church and Nonconformity, agnosticism, criticism. Consider the case of a conquering people. Its gods come into conflict *ex hypothesi* with those of the conquered; their demonstrated superiority immediately creates in the victim a feeling of contempt for the proved inefficiency of the conquered gods. For the future, in the absence of a change of fortune, the victors have a very poor opinion of the rites characteristic of their new slaves, who at the same time are generally compelled to sink lower in the scale of culture. Thus, on the one hand, the conquered religion is liable actually to degenerate, and in any case it is mere Magic from the standpoint of the conquering people. *And yet, extraneous events apart, it is of precisely the same character.*

In the same way, one priest's methods are found more successful than another's; he becomes official, an expert or specialist. The latter is driven to new expedients: he must pander to those who are in opposition to the official classes, which naturally pin their faith to the specialist. Naturally, his aim is malevolent, underhand, destructive, and so on. Professional jealousy, just like the national jealousy of which we have spoken, leads the specialist or official priest to sneer at his discredited rival as a

"quack," or in this case a magician. *Yet circumstances alone have produced this distinction.* In both cases we find the same attempt to create profitable relations with supernatural powers; both equally represent a rational scientific seeking after useful knowledge, which will solve the problem of life.

When we further recollect that the growth of knowledge and a wider outlook inevitably discredit the cruder beliefs of the animistic stage, we shall probably find it unnecessary to seek for any other distinction between magic and religion than that which is involved in the social, racial, and intellectual differences produced by the action and reaction of one man upon another. The two things are probably, therefore, parallel growths; neither can or need be said to precede the other. That magic, whether it be condemned as "black" or condoned as "white," is always looked upon as irreligious, only confirms this view; just as theologians have throughout history condemned as irreligious the views of their opponents, though they may differ only in a single word, so the magician is condemned by the self-styled "orthodox," though they may themselves, like the ancient Egyptian priests, practise a very similar kind of sorcery. The magician is always in opposition, and is therefore fighting against superior force of numbers and so forth, is an Ishmael, a malevolent. His opposition itself is wrong; his methods are destructive; his aim is the overthrow of his superiors.

Such in outline is the character of magic. Instances are too numerous in kind and too common to need a serious enumeration here. A few characteristic points must, however, be briefly mentioned. Of these one of the most interesting is the distinction already mentioned between Black Magic and White. As we have said, many magical rites are strongly religious in character. Thus the sacrifice (a Zulu rite) of black cattle to bring rain is partly religious, partly magical; the sacrifice is religious, while the supposed causal relation between the blackness of the cattle and the dark cloud is magical. Such rites performed by officials are regarded as legitimate, and are called White Magic. Their object is a good one. But when a witch obtains possession of the nail-parings of a man with the idea that she thus obtains power over him to injure him at will, her power is unauthorised, and is called Black Magic. The distinction is purely accidental or utilitarian, not generic or moral. Again the priests, whose prestige and revenue are imperilled by unofficial imitators, frequently denominate as Black Magic that which in their hands is White. The priest may cast out a devil; the same action on the part of the unofficial practitioner shows that he is in league with the devils.

The second important subject in this connexion is what is known as "sympathetic magic," the idea that the course of nature can be influenced by a human imitation, on however small a scale, of the desired event. Such are the attempts to produce rain by sacrificing black cattle, by pouring water out of a bowl, by causing a victim to shed tears;

other common cases are whistling for the wind, savage war-dances in imitation of actual fighting. So some savages carefully conceal their names and object to being photographed lest an enemy by knowing their names or possessing pictures of them should be able to exercise power over them. Here again we have the highly scientific attempt on the part of the savage to establish friendly relations with the powers of nature. He represents his desire in a vivid picturesque form, and no doubt comes to believe that there is a real causal connexion between the imitation and the real event. Thus a magician makes a waxen figure of an enemy and then melts it, with the idea that the man's strength ebbs away as the wax melts. In all cases we see the fundamental all-pervading hunger for power, personal safety, wealth, and prestige.

Ancestor Worship. We have still to investigate that important, practically universal, side of religion which is concerned with the worship of ghosts and the attitude of man towards the phenomena of death. One of the earliest problems preserved to primitive man was that of explaining what happened when a man, an animal, or a plant died. In the case of the man and the animal, he saw the body practically unchanged, and yet utterly different. Something had gone. Now, in the first place, the thing that has left the body obviously must be somewhere else: in other words, there was no idea of annihilation. Secondly, the savage, as we have seen, saw spirit in everything; it was the thing he postulated as the source of energy in animals, natural objects, or in man. Thirdly, he was already acquainted with the phenomena of sleep and dreams; he had himself dreamt; he had seen others fall asleep, and subsequently wake; he had theorized about shadows and reflections in water. Consequently he became quite familiar with the idea that the spirit was separable at will from the body, and that it persisted unchanged in character with the old emotions of fear, anger, friendliness, hostility. But, by a very reasonable argument, the savage theorist postulated one great difference. He knew that the vulnerable part of the whole man is the body, and argued that the spirit, away from the body, must become superior to bodily injuries and limitations. Hence the departed spirit is a great power whose friendship must be won and kept by the usual methods pursued towards the dead man when he was alive. In the case of a very great man, his power would be magnified as time went on, while lesser men would gradually be forgotten. This is the explanation of ancestor worship—which is practically a universal phenomenon—in its most general form. For example, in Shintoism there are "eight million deities recruited from the souls of heroes, rivers, mountains, etc." (Clodd, *Animism*, p. 91). In China and Japan, the cult of ancestors is especially predominant; the system of Confucius is based upon it. In the cultured religions of Greece and Rome, as in the simplest animistic cults, it is fundamental and persistent.

This fact has led many to believe that all religion is ultimately the worship of the dead. So Euhe-

merus of Messene maintained that all the gods are deified men, and Herbert Spencer similarly regarded polytheism as the worship of departed heroes. Now there is no doubt that this element is important; the gradual deification of great men may be watched in China and India at the present day; the canonisation of saints in the Roman Catholic Church, though in most points quite distinct, is also to some extent analogous. There are many cases in history of a "hero" oscillating uncomfortably between prosaic facts and Olympian dignity; moreover, the recognised gods are often credited with distressingly human actions which savour strongly of historical facts decorated by a friendly tradition. At the same time, if the generally received accounts of animism are accepted, ancestor worship is only one of the numerous forms in which that primal animism is developed. In a word, it is impossible, as indeed it is unnecessary, to explain in the same way the gods of primitive Latium and the deified emperor of the highly artificial society of Imperial Rome. On the other hand, it is always necessary to remember that all the gods of primitive man are entirely anthropomorphic; *i.e.*, their attributes are merely those of men more or less exaggerated. Hence the ideas of departed ancestors and those of nature-spirits must have continually acted and reacted upon each other, and fusion is probably common; we have seen already the close connexion between totemism and ancestor worship.

The attitude of the living to the dead is often regarded as specifically one of fear; and this is upheld by the fact that all simple folk are afraid to walk through a churchyard at night. It is not, however, true that all ghosts were considered harmful. The point is, as usual, that they were possible sources of good and evil. Those who were kindly became gods; the harmful grew into demons. Thus the Patagonians believe that magicians become demons; others that the ghosts of the drowned lurk in ponds seeking to lure others to the same fate; in India we find a class of spirits called Bhuts, which are the ghosts of men who died by violence; vampires, according to Malay belief, are the spirits of women who have died in childbirth. In ignorance of the physical laws of life, death, health and sickness, the savage naturally attributed all untoward events, especially diseases, to such malevolent, demoniac action. Thus a dead ancestor was lonely and sought a companion; one who had been a brutal tyrant persisted in his hostility. In such ideas as these we see the germs of an ethical conception of the after-life; the good pass into a life of congenial occupation; the bad are tormented by having to wander far and wide, or to pursue an uncongenial occupation.

Another important element is that of family pride. The relatives of a dead hero sought to retain the power and prestige which his reputation had secured them by keeping his greatness always before the eye. Respect for the departed combined very easily with a lively sense of the value of prestige. Thus the Romans periodically carried images and pictures of their ancestors in procession; the Egyptians preserved the mummy;

Siberian tribes make rough images to which they pay tribute of worship and sacrifice. The original idea of such images was to provide a resting-place for the spirit, so that it might always be at hand to watch over the living. Or, again, the dead man must not be allowed to go to the shades without wives, weapons, priestly counsel; hence in various countries we have the practice of suttee, the burial of a man's weapons, the killing of his priest. Finally in this connexion, the erection of sepulchral memorials is due partly to family pride and partly to the desire to give to the spirit a local habitat; the fees exacted from visitors to such memorials, the sale of relics, and the like, must have been a powerful incentive to the glorification of the dead.

The Spirit-World. This same idea that the departed spirit must have a local habitation gives rise among all peoples to more or less elaborate ideas of a separate spirit-world or heaven, the home of separated spirits, which, however, can generally return to visit the earth at will. Frequently we find this spirit-world pictured as a place of gloom, misery, and discomfort; such is the Hades of Homer, Virgil, and Dante, of the early Jews, of the Tshi-speaking peoples of West Africa. In other cases, as among the Red Indians, the Kalmuks, the people of New Hebrides and Tasmania, the spirit-world is a happy-hunting ground, a Valhalla, the Isles of the Blest; sometimes it is above the earth among the stars, sometimes beneath the earth, the "under-world." In all cases, however, the ideas are anthropomorphic; the conditions of the after-world are analogous to those of earthly life. The very common idea that it is merely a "far country" across a torrential river, deserts, and mountains, is a very natural analogy from the difficulties ordinarily experienced by primitive travellers and emigrants (*cf.* the Greek Styx over which Charon ferries the souls to their last home, at the entrance of which stands Cerberus hostile to the travellers). Further, we find in the more advanced religions the after-world divided into regions specially allotted to the departed according to their deserts; here the ethical idea of reward and punishment becomes predominant, as in the Christian belief in heaven and hell; or again the Chippewas hold that the ghost of a murdered man torments that of his murderer. Analogous to this idea of retribution in the after-world is that of transmigration. Primitive man believed that the human spirit could not only leave the body, but could actually enter into that of an animal. So after death, as in the case of the totem animal, the spirit might pass to the body of another man or of an animal. Many tribes believe that animals such as monkeys, pigs, toads, etc., are merely men who are thus reaping the reward of wicked lives. The inter-relation of this idea with those of ancestor-worship and totemism is too obvious to need detailed examination.

Summary. We have thus considered:—(1), the meaning of the term "Religion"; (2), the methods and wider relations of Comparative Religion as a science; and (3), the probable origin of primitive belief in the Supernatural with the more important stages in the development of that belief. This is not the place for a detailed account of the

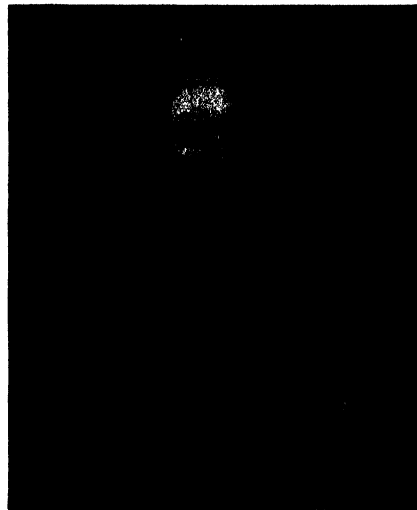
whole body of beliefs held by any particular people, nor of what are generally called the "higher" religions. The references made to these subjects have been made sparingly, and solely for the sake of illustration; the student is referred for full particulars to special ethnological and other articles. The great truth which he must keep in his mind is that in primitive religion we have the earliest attempts made by man to arrive at an explanation of natural phenomena. These attempts are natural science in its infancy. They are strictly rational in quality, though, of course, from the standpoint of modern science, their results are generally ridiculous. Still they contain ideas which, expressed in another terminology, are closely analogous to those of modern science. Thus parallel to animistic beliefs is the scientific principle of the omnipresence of ether; the separate existence of the spiritual element reappears in the new sciences which deal with the phenomena of suggestion, hypnotic trance, and the like. It is true that primitive man was not an adept in scientific classification, and yet in his methods of argument we discern a vague consciousness of logical principles. J. S. Mill's methods of difference, similarity, concomitant variation, are all applied, though perhaps not judiciously, and with very limited and ill-selected data to work upon. In all cases we see the fundamental principle that knowledge is power, and that it is derived primarily from things seen, heard, touched, *i.e.*, from experience. While, therefore, it is true that animistic man is very different from the modern scientist, and that in the course of ages religion has often so far deserted the sphere of practice as to be separate from and even hostile to science, thus forsaking her natural and proper function, yet the origin of religion is precisely identical with the first gropings of the scientific instinct, and the practical curiosity of animistic man is the true lineal ancestor of all scientific inquiry, just as truly as it was the immediate parent of superstition.

Bibliography. The general literature is enormous. Evidence is to be found in all books of travels, ancient and modern, and also in periodicals. Among modern comprehensive works, the following authorities are of the first importance: J. G. Frazer, *Totemism and The Golden Bough* (ed. 1900); E. B. Tylor, *Primitive Culture*; Andrew Lang, *Myth, Ritual and Religion and The Making of Religion*; C. P. Tiele, *Elements of the Science of Religion*, article *s.v.*: "Religions" in the *Encyclopædia Britannica* (9th ed.); Lefèvre, *La Religion*. A most valuable work is F. B. Jevons's *Introduction to the History of Religion* (1902), while the brief summary of J. A. Macculloch (*Religion* in the "Temple Cyclopædic Primers" series) is a model of compression, which has suggested to a great extent the plan of the present article, though its views are not entirely accepted. A brilliant sketch of primitive man is Edward Clodd's *Animism* in the "Religions Ancient and Modern" series (1905), representing the modern attitude of the scientific anthropologist.

Remainder, CONTINGENT, in law, a remainder which is not vested. A remainder is a future estate

so created that possession and enjoyment cannot take effect until after the expiry or determination of a life-interest or other estate in it. Therefore a remainder can only be vested when the event which will terminate the particular prior estate is certain to happen and the person designated to enjoy it is in existence.

Rembrandt Harmensz Van Rijn, painter, was born at Leyden, Holland, on July 15th, 1607, though some authorities give 1606 and others 1608 as his birth-year. He was destined by his father, a miller, for the profession of the law; but he disliked the prospect and studied painting under Jacob van Swanenburch and Pieter Lastmaus, afterwards completing his artistic education by himself. In 1630 he went to Amsterdam and there attended lectures on anatomy, which gave him a subject for his well-known picture entitled "The Lecture on



REMBRANDT HARMENSZ VAN RIJN.

(Painted by Himeol.)

"Anatomy" (1632), now in The Hague. He married Saskia van Uylenburch, a woman of property, in 1634, and on her death, in 1642, she left him her money on condition that, if he married again, it should go to her children. In this year he painted one of his greatest works, "The Sortie of the Company of the Banning Cocq," otherwise known as "The Night Watch," now in Amsterdam. Rembrandt did marry again, and, as he was an extravagant purchaser of works of art, he became bankrupt in 1656. After the year just mentioned he lived in poverty and obscurity, though working hard at his profession, and, in 1661, produced another superb work, "The Syndics of the Drapers," in Amsterdam. He died in Amsterdam on October 8th, 1669. He was especially great as an etcher and produced a large number of very fine plates. Between 1628

and 1661 there were at least 400 produced by him. His mastery of light and shade is still the admiration of the art world. Nor was he much less gifted as a painter, and some of his pictures are among the prized treasures of the Dutch school. Many of his works are at Amsterdam and The Hague, but the National Gallery in London possesses a considerable number of them, including many fine etchings, two portraits of himself by his own hand, his "Woman Taken in Adultery," "Christ Blessing Little Children" and "The Adoration of the Shepherds." There are beautiful examples in other public galleries in the United Kingdom, notably "The Girl in Bed" in the National Gallery, Edinburgh, the "Young Girl at a Window" in Dulwich Gallery and numerous characteristic works in the Wallace Collection in Hertford House.

Remembrancer, the name of three officials of the English Exchequer whose duties were to draw up records and processes. The King's Remembrancer is the head of a department in the central office of the Supreme Court of Judicature. Some corporations, as that of the City of London, have an official with this title.

Remiremont, a town in the department of Vosges, France, on the Moselle, at the confluence of the Moselotte, 16 miles S.E. of Epinal. Saint Romaric founded a monastery here in the 7th century and the Carolingian kings soon afterwards erected a castle, which was variously called Romarici Castellum and Romarici Mons, from the latter of which the present name was derived. The district afterwards belonged to the Counts of Alsace, from whom, in the 11th century, it passed to the Dukes of Lorraine, who befriended and enriched the convent to which the town owes its fame. The abbess was a princess of the Empire and was consecrated by the Pope, while the fifty canonesses were all of noble birth. By the 17th century deterioration had set in, the sisters relaxed their vows, took the name of countesses and consented to marry. Attacked by the French in 1638, almost destroyed by earthquake in 1682, the town was united to France in 1766. During the Revolutionary period the monastery and nunnery were suppressed. The parish church was formerly the abbey church and the palace of the abbesses is now the hôtel de ville. Tanning, weaving and cotton-spinning are carried on. Pop. (1901), 10,322.

Remittent Fever, also called BILIOUS FEVER and JUNGLE FEVER, is due to the action of malarial on the system and, in its severest forms, is found in West Africa, the East Indies, certain parts of North and South America, and the West Indies. It consists of three stages. At first the patient experiences a sense of chilliness, with a feeling of nausea, lassitude and oppression at the pit of the stomach. The hot stage follows, with cruel headache, racking pains in the limbs, burning skin and continued vomiting. The moist stage ensues, in which the fever abates, the pulse grows slower, the headache is less, the vomiting ceases and the patient obtains some sleep. In most cases the disease will reach a favourable termination

with ordinary care. In severer cases the medical man should be called in promptly. Treatment at first will be purgative and, if the hot stage be acute, cold towels must be applied to the head and the body sponged with tepid water. The vomiting, which is likely to be very exhaustive, must also be combated with ice, or the application of mustard poultices to the stomach, or the administration of ipecacuanha wine at frequent intervals. After the moisture sets in, ten-grain doses of quinine must be given until the patient has taken thirty grains between one attack of fever and another. The patient's strength must be sustained by nutritious food and his thirst quenched by iced water, or lemonade, or milk and soda.

Remonstrance, in English history, the Great Remonstrance, a petition against serious abuses in government presented by the House of Commons to Charles I. in 1641. In ecclesiastical history, the protest, in five written articles, of the Dutch Arminians against certain Calvinistic tenets presented in 1610 to the States-General of Holland.

Remora, or SUCKING-FISH, a fish belonging to the Acanthopterygian genus *Echeneis*, with several species, from temperate and tropical seas, most abundant in the Pacific and Indian Oceans. They derive their popular name from the fact that the first dorsal fin is modified so as to form an adhesive disc on the top of the head, by which they attach



REMORA, OR SUCKING-FISH.

themselves to larger fishes, turtles, and even ships. *Echeneis remora* is found in the Mediterranean. In classical times and the Middle Ages the fish was regarded with a certain degree of superstition and was thought to retard the progress of vessels of considerable size through the water.

Remscheid, a town of Rhenish Prussia, Germany, 20 miles N.E. of Cologne. It is the centre of the German cutlery and hardware industry and hence has been described as the "Rhenish Sheffield." It owed its first impetus in manufactures to Protestant refugees from France and the Netherlands. Pop. (1900), 58,100.

Remusat, JEAN PIERRE ABEL, Orientalist, was born in Paris on September 5th, 1788. He was a member of the medical profession, who learnt Chinese in early life and was led by his studies to devote himself almost exclusively to that language. He published in 1811 a couple of treatises on the literature of China, became professor of Chinese at the Collège de France in 1814, and in 1822 helped to found the Asiatic Society of Paris, of which he was president. He was appointed Keeper of the Oriental MSS. in the Royal Library in 1824 and died of cholera in Paris on June 4th, 1832. Among his best-known works are the *Éléments de grammaire chinoise* (1822), *Mémoire sur la vie de Lao-*

Ts'u, the celebrated Chinese philosopher (1823), and *Mélanges asiatiques* (1825, 1828).

Renaissance, or RENAISSANCE, the "new birth" or revival of learning and art in Europe in the 14th and 15th centuries, which was partly the result of the Crusades, of Wycliffe's teaching, and of Poggio Bracciolini's services in the study of classical Latin (1416-59), but which received a great stimulus from the influx of Byzantine scholars and manuscripts into Italy upon the fall of Constantinople (1453), from the invention of printing a few years later, and the discoveries of navigators in the last half of the 15th century. The Renaissance architecture was mainly due to the study of ancient examples by Brunelleschi of Florence (1377-1446). The Renaissance, which divides modern times from the mediæval world, was at its height between 1475 and 1525 and among the illustrious names by which it was inspired and adorned were those of Giotto, Petrarch, Michael Angelo, Bramante, Fra Angelico, Masaccio, Botticelli, Lorenzo dei Medici, Leonardo da Vinci, Raphael, Machiavelli, Politian, Ariosto, Correggio, Titian, Aldus Manutius, Louis XII. and Francis I. of France, Sir Thomas More and Erasmus. To trace all that the New-birth meant and what it accomplished in the Eternal City can best be understood after the study of Rodolfo Lanciani's *The Golden Days of the Renaissance in Rome* (London: Constable), where the movement is discussed in all its bearings.

Renan, ERNEST, philosopher and historian, was born at Tréguier, department of Côtes-du-Nord, France, on February 27th, 1823. His father was a master-mariner who was lost at sea. He was educated by the Catholic clergy of his native place and in 1836 proceeded to Paris to enter a college, his aptitude for learning being very noticeable. He studied theology closely with a view to becoming a priest, and in 1842 entered St. Sulpice to learn Hebrew and Syriac. His reading convinced him that he could no longer remain a Catholic, still less become a priest, and he left the college and took to teaching (1845). He had even then conceived the idea of writing a life of Jesus embodying his views as to His attributes. In 1848 he obtained a premium for an essay on the Semitic languages, which established his reputation as an Orientalist and was published in an amplified form in 1855. The Academy of Inscriptions, recognising his merit, sent him on an antiquarian mission to Italy in 1849, and in 1851 he was given a post in the Manuscript department of the Bibliothèque Nationale. In 1852 his first book of real importance (*Averroës et l'Averroïsme*) came out, and he became a member of the Academy of Inscriptions. His *Études d'Histoire religieuse* appeared in 1857, his *Essais de morale et de critique* in 1859, and in 1860 he went to Syria on a second mission for the Academy. There he wrote much of his *Vie de Jésus*, but it did not appear till 1863. It caused the most extraordinary sensation, and its author was assailed in many quarters for his opinions. Its beautiful style and mastery of language and wonderful learning captivated most literary people. He had been appointed in 1862 professor of Hebrew

in the Collège de France, but only delivered one lecture, the outcry raised leading to his suspension and transference to a post in the Bibliothèque Nationale, much to his chagrin. In 1870, however, he was reappointed to the chair. The *Vie de Jésus* was the first volume of a series on the history of the Christian Church, the others being *Les Apôtres* (1866), *St. Paul* (1869), *Antéchrist* (1873), *L'Église chrétienne* (1879) and *Marc Aurèle* (1880). In 1879 he was elected an Academician, and his other



ERNEST RENAN.

(From the portrait by L. Donnât.)

notable books are his *L'Abbesse de Jouarre* (1886), which created some stir, *Histoire du peuple d'Israël* (begun in 1887), and some delightful *Souvenirs d'Enfance et de la Jeunesse* (1883). To his high-souled and admirable sister Henriette he was indebted for sympathy and support when these were most valuable. In 1856 he married a niece of Ary Scheffer, the painter. Renan died in Paris on October 2nd, 1892, and was buried in the Pantheon. He was essentially a great writer, but he was also a great thinker.

Renfrew, the county town of Renfrewshire, Scotland, on the Clyde, 6 miles W. by N. of the Broomielaw, Glasgow. Walter Stewart, founder of the Scottish royal family, erected a castle on a height overlooking the river. The town received its first charter from Robert III. in 1396 and in the following century the heir to the throne was created Baron Renfrew, a title still borne by the Prince of Wales. There are capacious docks and shipbuilding and weaving are carried on. Pop. (1901), 9,296.

Renfrewshire, a maritime county in the west of Scotland, bounded on the N. by the Clyde (though a few acres are situated on the right bank of the river), on the E. by Lanarkshire, on the S. by Ayrshire and on the W. by the Firth of Clyde.

From north-west to south-east it measures 30 miles by from 10 to 15 miles in breadth and covers an area of 245 square miles. The land along the Clyde is fair, flat, and fertile, but rises towards the Ayrshire border, where, in the Hill of Stake, it reaches an elevation of 1,711 feet. The chief rivers are the Gryffe, White Cart and Black Cart. The minerals include coal, ironstone, limestone and sandstone, the first two being extensively worked, while shale occurs beneath the ironstone and yields oil. Owing to the great demand for dairy produce, agriculture is vigorously carried on, the principal crops being wheat, oats, beans, turnips and potatoes, while sheep and cattle are pastured in large numbers. Next to Lanarkshire the county is the most important industrial and manufacturing area in Scotland. The manufactures include all kinds of textiles, and Paisley is the headquarters of the sewing-cotton trade. There are many bleachfields, dyeworks, calico- and shawl-printing works, flax-spinning mills, paper mills, starch mills, iron foundries, engineering shops, shipbuilding yards, sugar refineries, distilleries, breweries and a vast seaborne traffic. There are fisheries from Greenock. The Romans occupied the country for three centuries till their withdrawal in 410 and after them the Cumbrian Britons, with a capital at Alelyde (now Dumbarton), were the dominant race. In the reign of David I. Walter of Shropshire settled in the district and being appointed the steward for the Crown acquired, with his followers, enormous estates, which long continued to form the appanage of the eldest sons of the Scottish sovereigns. At Langside, now within the boundaries of Glasgow, Queen Mary suffered, in 1567, that defeat which was really the beginning of the crowning tragedy of her unhappy career. Greenock, Paisley, Port Glasgow and Renfrew (the county town) are the principal towns. Pop. (1901), 268,980.

Renl. [GUIDO RENL.]

Rennell, JAMES, was born on December 3rd, 1742, at Chudleigh, Devonshire. His father, John Rennell, captain in the Royal Artillery, died while he was a boy and he found in the vicar of Chudleigh, the Rev. Gilbert Burrington, a guardian and friend by whose advice and assistance he entered the navy in 1756. He saw active service under Captain Hyde Parker when he went to the East Indian Station in 1760 and, having mastered marine surveying, Parker lent him to the East India Company. Seeing no chance of promotion he left the navy and, reaching Calcutta at a time when the Governor wished to initiate a survey of British territory, was appointed Surveyor-General, being given a commission in the Bengal Engineers, on April 9th, 1764, and he afterwards rose to be major in the Company's army. By his marriage in 1772 he became great-uncle to William Makepeace Thackeray and when, after a laborious career, he retired in 1777 he was awarded a pension of £600. His life was henceforth devoted to the study of geography, in which his pre-eminence is undisputed. His *Bengal Atlas* (1779) was of the highest strategic importance. This was followed by a series of works on India, including *Memoirs of a Map of*

Hindustan (1783). In 1788 he was elected F.R.S. and in 1797 assisted Mungo Park to prepare the map illustrating his famous travels. Rennell's *Geographical System of Herodotus Examined and Explained* (1800) is his most famous work. In addition to many other publications, his study of winds and currents and his charts of the Atlantic have been of the greatest value, while his observations of the current which endangers ships off Scilly have since caused it to be known as "Rennell's Current." Generous, unassuming, and ever ready to impart his stores of learning to others, when he died, on March 29th, 1830, he was honoured with interment in Westminster Abbey.

Rennes, the capital of the department Ille-et-Vilaine, France, at the junction of the Ille and Vilaine, about 65 miles N. of Nantes. The Vilaine, which flows from east to west and is crossed by several bridges, separates the High from the Low Town. The Basse-Ville lies low and is subject to inundations, and the streets are poor and narrow; but the Haute-Ville, most of which was destroyed by fire in 1720, has wider streets and some good buildings, the principal of which are the Cathedral, the University, the Museum, the Municipal Library, Palais de Justice and the Hôtel de Ville. There is a considerable trade in butter, honey, wax, lace, cotton and linen yarns, and among the industries are tanning, boot-, hat-, and glove-making, the manufacture of agricultural implements and of stained paper, and printing. The chief town of the Redones (from whom its name is derived), Rennes became the capital of Brittany and was the place where the dukes were crowned. During the various periods of internecine strife in France the city changed hands more than once, but it stood out for its provincial rights whenever it could. It suffered less than Nantes in the Reign of Terror owing to the courage and integrity of Leperdit, its Mayor. The second Dreyfus court-martial was held here in 1899. Pop. (1901), 74,676.

Bennet, a preparation of the fourth stomach of a calf used in the manufacture of cheese for curdling the milk.

Rennie, JOHN, civil engineer, was born at Phantassie, Haddingtonshire, Scotland, on June 7th, 1761, and was educated at Dunbar and Edinburgh University. A man of an inventive turn of mind and skilled in handicraft, he was employed for a time at Soho, Birmingham, by Boulton and Watt, for whom he superintended the building of the Albion Mills in London. Afterwards he started business on his own account in Holland Street, Blackfriars. Among his early works were the Hull Docks, Kennet and Avon Canal, Rochdale Canal, and Royal Canal, Ireland. His greatest works, however, are his bridges, which include some of the finest over the Thames, such as Waterloo (1817), Southwark (1819), and London Bridges. Besides these, we owe to him the London Docks, East India Docks, Sheerness Docks, Holyhead Harbour, and the great Plymouth Breakwater, which was not completed till 1848. He became F.R.S. in 1798 and contributed to the scientific journals. He died

in London on October 4th, 1821, and was buried in St. Paul's Cathedral. **GEORGE RENNIE**, his elder son, was born in London on December 3rd, 1791, and educated at Isleworth, St. Paul's School, and Edinburgh University. He became inspector of machinery and clerk of the dies at the Mint in 1818 and, in 1821, entered into partnership with his brother to carry on the enterprises initiated by their father. He was elected F.R.S. in 1822 and died in London on March 30th, 1866. **SIR JOHN RENNIE**, younger son of John Rennie, was born in London on August 30th, 1794, and educated privately at Isleworth and Greenwich. He entered his father's business and conducted it after his death. When London Bridge was opened in 1831 he was knighted. He was engineer to the Admiralty, but is known chiefly as the completer of the undertakings planned and begun by his father. He died at Bengoe, near Hertford, on September 3rd, 1874.

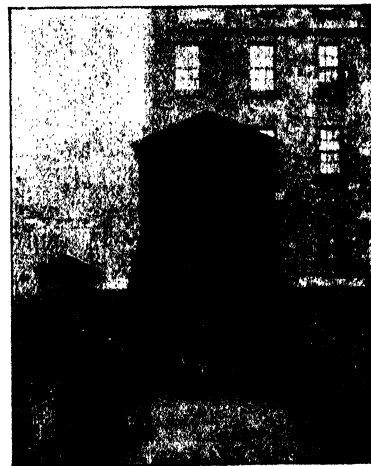
Renoir, PIERRE AUGUSTE, impressionist painter, was born at Limoges, France, in 1841. In 1859 he went to Paris and entered the studio of Gleyre, where he had the good fortune to make the acquaintance of Claude Monet, Sisley and Bazille. In 1864 he exhibited "Esméralda" at the Salon and continued to exhibit up to 1890. In 1875, together with Monet, Sisley and some others, he formed the group of impressionist painters which afterwards became celebrated. His paintings include a variety of subjects—portraits, Algerian subjects, landscapes, flowers, but, above all, scenes of modern life in tea-gardens, at public balls and *fêtes champêtres*. His principal works are to be seen in the Luxembourg Gallery and include "Le Moulin de la Galette," "La Liseuse" and "Jeunes Filles au Piano." Among his portraits may be mentioned "Mme. Charpentier," "Richard Wagner," "The Reader" (Claude Monet), while chief among his paintings of modern life are "La Loge," "Danse à la Ville," "Danse à la Campagne" and "Femme à l'Éventail." His work, though unequal, was always brilliant and interesting. Especially happy are his renderings of effects of light and moving shadows.

Rent, in law, an annual or other periodical return (usually money) made by a tenant to the landlord in consideration of the occupancy of lands or tenements. There are several kinds of rents; the following are some of them:—(1) Rent Service, so called because it has some corporeal service incident to it as, at the least, fealty. (2) Rent Charge, where the owner has no future interest or reversion in the land. (3) Fee Farm Rent, one issuing out of an estate in fee, of at least one-quarter of the value of the land at the time of its reservation. (4) Quit Rents, because thereby the tenant goes quit and free of all services. (5) Rack Rent is a rent of the full annual value of the land or tenement, or near thereto. Rent is not due till midnight of the day upon which it is reserved, although sunset is the time appointed by law to make a proper demand for it, to take advantage of a condition of re-entry, or to tender it, in order to avoid a forfeiture; but, more properly speaking, the

demand should be made before sunset, so as to allow sufficient light to count the money, and the person making the demand must remain on the land till the sun has set. Rent is of a higher nature than ordinary debts and can be distrained for. [DISTRESS.]

Renton, a town of Dumbartonshire, Scotland, on the right bank of the Leven, 2 miles N. of Dumbarton. The calico-printing, dyeing and bleaching industries are important. The public buildings include the Victoria Institute, opened in 1887 in commemoration of Queen Victoria's Jubilee, and the public hall. The parish church occupies the site of Dalquhurn House, where Tobias Smollett, the novelist, was born in 1721. An obelisk, the inscription for which was revised by Dr. Johnson, was erected to his memory in 1775. Pop. (1901), 5,067.

Benwick, JAMES, the last martyr of the Covenant, was born at Moniaive, Dumfriesshire, Scotland, on February 15th, 1662. Educated at



MARTYRS' MONUMENT, EDINBURGH.

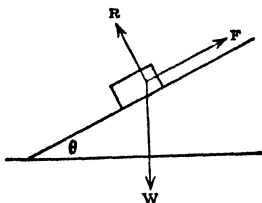
(Photo: Pictorial Agency.)

Edinburgh University for the ministry, he was (according to one account) refused his degree as he could not take the oath of allegiance. Ordained at Groningen in Holland in 1683, he returned to Scotland, where he was in great request as a field-preacher, but was soon declared an outlaw for his "Apologetick Declaration," which he fastened to church doors, town crosses and other places. He took part in the second demonstration against the king at Sanguhar in 1685 and ever afterwards preached at the imminent hazard of his life. He was captured at last and executed in the Grassmarket, Edinburgh, on February 17th, 1688. Nothing need be added to the haunting simplicity of the inscription on the well-known Martyrs'

Monument in the adjoining Greyfriars Churchyard:—"From May 27, 1661, that the most noble Marquis of Argyle was beheaded, to the 17th February, 1688, that Mr. James Renwick suffered, were one way or other murdered and destroyed for the same cause about eighteen thousand, of whom were executed at Edinburgh about a hundred of noblemen and gentlemen, ministers, and others—noble martyrs for Jesus Christ. The most of them lie here."

Repairs are the needful works required from time to time to be done to houses or other property. Where the property is held on lease, repairs are generally done by the lessee under the covenant in his lease usually known as a "repairing lease." In property let by the week or month, the necessary repairs are executed by the landlord, who also allows for ordinary wear-and-tear in houses let on three-years' agreements.

Repose, ANGLE OF. If a mass be placed upon a board and the latter be tilted up until the mass is just on the point of sliding, the angle which the board makes with the horizontal is called the angle



of repose. In this case there is equilibrium between the weight, W , of the mass acting vertically downwards, F , the friction, acting along the board, and R , the resistance of the board, acting normally. By resolving these forces along the plane and perpendicular to it we get (1) $F = W \sin. \theta$ (2) $R = W \cos. \theta$. Hence $\frac{F}{R} = \tan. \theta$. The ratio $\frac{F}{R}$ is the coefficient of friction: hence the angle of repose may be defined as that angle whose tangent is the coefficient of friction. It is sometimes known as the angle of friction.

Repoussé, relief in metal work, produced by hammering or punching a thin sheet of copper, pewter, or other metal from behind. The raised parts are then treated with finer tools and, if necessary, chased and engraved. Repoussé has become a favourite pursuit of amateurs, many of whom attain a high degree of excellence in the art.

Representation, in law, the coming in of children of a deceased heir to take the share which he would have had if he had survived; the children represent him among other heirs of the ancestor.

Reprieve, the withdrawal or suspending for a time of a sentence which has been recorded against a prisoner. In the United Kingdom the power of reprieve is vested in the Crown and

exercised through the Home Secretary, but (as became evident in 1907) public opinion began to declare itself strongly in favour of the abolition of the death penalty. In exceptional instances the Court has power to order temporary reprieve.

Reproduction, in plants, after nutrition the second great function of plant-life, effected by methods that fall under two classes, vegetative and sexual. The former class includes division or separation of ordinary vegetative parts and the development of specialised but asexual reproductive structures. Such specialised reproductive structures and similar structures of a sexual character if unicellular or minute and undifferentiated, are generally termed spores, those differing in origin being distinguished by various prefixes. The simplest case of vegetative reproduction is the fission, or division into two, of many unicellular plants, especially Schizophyta. This process, not accompanied by separation in the formation of the tissues of the higher (multicellular) plants, in these cases forms two individuals from one. The gemmation, or production of lateral bud-like cells, by the yeast-plant, is a closely related process. The natural separation of the innovations or branches in mosses by the decay of the main stem, belongs also to this class, and is precisely analogous to artificial reproduction by cuttings. Mosses exhibit greater capacity for vegetative reproduction than any other group of plants, their stems, leaves, sporogonia or rhizoids being all capable of putting out protonema-threads on which bud new plants. This, and the viviparous production of young plants on the fronds of many ferns and on the leaves of Begonia and of Bryophyllum, are slightly higher stages, being the production of specialised structures, and leading to the bulbils of the onions and tiger-lilies. The soredia of lichens, buds containing both gonidial and hyphal cells, the gemmæ borne in special receptacles by mosses and liverworts, the cloves of bulbils, and such tubers on underground shoots as those of the potato, are all analogous structures. Spores when furnished with cilia are known as zoospores, and other terms such as tetraspore, stylospore, basidiospore, etc., are applied in particular cases, where the spores are in groups of four, on stalk-like processes, or otherwise distinguished. In most cryptogams the production of asexual spores forms a marked stage in the life-cycle, or generation in the life, of a plant, known as the sporophyte, which alternates with that in which sexual reproduction takes place, which is termed the gametophyte. [ALTERNATION OF GENERATIONS.] This sporophyte may be relatively small, as in mosses, where it consists mainly of the sporogonium, or it may be the main leaf-bearing plant, as in Pteridophyta. In certain cases one or other of these two generations is suppressed—the sporophyte stage in Characeæ and a few abnormal instances of what is termed apospory; the gametophyte, in some Ascomycetes, all Ecdionmycetes and Basidiomycetes among fungi, and in some abnormal ferns, this being called apogamy. Some fungi produce several distinct kinds of spores at different stages of their development, either on one

host-plant (monœcious) or on distinct hosts (heterœcious). Such *Ecidomyces* as *Puccinia* are examples of this polymorphism. [MILDEW.] In the highest Pteridophyta two kinds of spores are asexually produced: microspores, which are small and bear the male sexual cells, and megaspores, which are larger and bear the female structures. In flowering plants there is a similar heterospory, the microspore being known as the pollen-grain and the megaspore as the embryo-sac. In such cases the gametophyte has been reduced to mere appendages of the sporophyte. The cell or organ which gives rise to spores is termed a sporangium; and, if it is borne on a leaf, such leaf is called a sporophyll. Flowering plants are so called from bearing clustered groups of such sporophylls, those bearing microsporangia being known as stamens and those bearing megasporangia as carpels, whilst other leaves, performing such subsidiary functions as protection and insect-attraction, known as sepals and petals, are also generally part of the flower.

Sexual reproduction, absent in the lowest plants and in cases of apogamy, consists essentially in the union of two special cells or gametes, which are called planogametes when ciliated, aplanogametes when not. It is now tolerably certain that these sexual cells have been evolved from asexual reproductive cells and the organs containing them from asexual sporangia. The simplest case of sexual reproduction is that known as conjugation, as in *Mucor* or *Mesocarpus*, in which the uniting gametes are alike. In higher stages the female gamete oosphere, ovum, or germ-cell, is larger than the male, or sperm-cell, and their union is called fertilisation, its product being an oospore, whilst in conjugation it is called a zygospore. The organ enclosing the germ-cell is styled an oogonium in the lower plants where it is unicellular, and an archegonium in the higher classes where it is multicellular; but within the megaspores (embryo-sacs) of Angiosperms the archegonium is much reduced and no longer surrounds the germ-cell. Similarly the organ producing the (generally more numerous) sperm-cells is called an antheridium; but, whilst among cryptogams it generally gives rise to ciliated antherozoids, in flowering plants it is represented merely by the pollen-tube with its contained reproductive nucleus. The product of fertilisation varies considerably, from the unicellular zygospore of *Mucor* to the cystocarp enclosing numerous carpospores in the higher alga, the complex fructifications of the Ascomycetes, and the seed and fruit investing the embryo in Angiosperms. In these latter cases the effect of the sexual process extends to surrounding structures, producing, for instance, the change of the female sporophylls or carpels into a fruit. Whilst as a rule the asexually-produced spore becomes free and so disperses the species, in Phanerogams only the male microspore does so, the megaspore remaining enclosed within its megasporangium, the tericine, which, invested with other integuments, is detached as the seed, the most distinctive structure of the sub-kingdom. [FERTILISATION, POLLINATION, SEX, ETC.]

Reptanta, a group of mollusca belonging to the sub-order Azygobranchia characterised by the possession of a creeping disc-like foot. It includes three divisions: (1) Holochlamyda, including the Top-shells (*Trochus*) and the common pond-snail (*Paludina*); (2) The Pneumono-chlamyda, which are terrestrial and breathe by a lung sac, e.g., *Cyclostoma*; (3) Siphonochlamyda, which are all marine, including the Whelk (*Buccinum*), the Cone-shells (*Conus*), the Cowry (*Cypraea*), etc.

Reptiles, a class of Vertebrate Animals, below the Birds and above the Amphibians, but with affinities to both. The body is covered with horny scales or bony plates or shields; the temperature of the body does not greatly exceed that of the medium in which the animals live; the heart in most is three-chambered, only the alligators and crocodiles having two ventricles. Respiration is carried on by lungs, never by gills. The skull articulates with the atlas vertebra by means of a single condyle, and the jawbone with the skull by means of the quadrate bone. Most of the class lay eggs, but in some—the viper, for example—the eggs are hatched within the body of the mother. There are five living orders: (1) Chelonia or Turtles, (2) Rhynchocephalia or Beaked Lizards, (3) Lacertilia or Lizards, (4) Ophidia or Snakes, and (5) Crocodilia or Crocodiles. The fossil forms, too, are of exceptional interest, including as they do such gigantic creatures as the Ichthyosaurus and Plesiosaurus and the Flying Reptiles.

Repton, a town of Derbyshire, England, 7½ miles S.S.W. of Derby. It is a place of somewhat ancient history. Before 660 a mixed monastery was already in existence, which was destroyed by the Danes in 874. On its site the Saxons built a church dedicated to St. Wystan. Beneath the chancel of the present St. Wystan's, a church with a graceful spire, is a crypt, 17 feet square, with a vaulted stone roof, which is believed to have formed part of the cellarage or crypt of the monastery. The Augustinian priory built in 1172 was dissolved in 1538. The well-known grammar-school, dating from 1621, was replaced in 1886 by buildings in the Perpendicular style, from designs by Sir Arthur Blomfield. Pop. (1901), 1,695.

Republic, a commonwealth in which the head or heads of the executive are chosen by an electorate or indirectly by elected delegates or representatives. The electorate may range from a narrow oligarchy to a pure democracy in which every adult has the franchise. The chief republics have been those of Athens, Rome, Venice, in the past and the United States of America and France in the present.

Republican, one who lives under, or is in favour of, that form of constitution which is called a republic. In the United States the term has become attached to the political party, formed in 1856, which was opposed to the maintenance of slavery and which rose into power in 1860 with President Lincoln, and was the main element in resisting the secession of the Southern States; while the Democrats, as a "State-rights" party,

to some extent sympathised with the South. The Republican platform comprises a certain degree of centralisation, thorough Protection by a high tariff, and lavish expenditure of public money. Their management of the finances of the Union has always been singularly efficient and to them belongs the credit of the resumption of specie payment. It was under the Presidency of Theodore Roosevelt, a Republican, that the war with Spain was brought to a successful issue. In his person, too, a vigorous campaign was sustained against the more formidable Trusts. [DEMOCRATIC PARTY.]

Requiem, a mass for the dead, a distinctive rite of the Roman Catholic Church. In music it generally contains the Requiem proper, the Kyrie, Dies iræ, Domine Jesu Christe, Sanctus, Benedictus, Agnus Dei, and Lux Æterna.

Reredos, a decorated screen behind an altar, or, when the altar stands against the wall, a mural



REREDOS IN PETERBOROUGH CATHEDRAL.

(Photo : Pictorial Agency.)

decoration above and beside the altar. Usually reredoses are furnished with statues or are decorated with paintings and tapestry. There are fine examples in All Souls College, Oxford, Durham and Peterborough Cathedrals. In some instances their erection has given great umbrage to the ultra-Protestant section of the Anglican Church, as, for example, in the case of St. Paul's Cathedral (1889-91), where, it may be conceded on æsthetic grounds, the reredos is in very indifferent harmony with the noble interior. Originally the term meant the back of a fireplace.

Reserves, those military forces of a state which are only called upon in times of special danger or weakness. They consist in the main of soldiers and sailors who have served their time in the regular forces. In the United Kingdom they comprise the Army Reserve of time-expired regulars liable to be summoned into the ranks on occasions of emergency and of the Militia Reserve. The volunteers and yeomanry would form the second line of defence in the event of invasion. The Naval Reserve is an auxiliary to the Royal Navy.

Resins are a class of substances which are of vegetable origin, being usually obtained (1) as exudations from the bark or incisions of certain trees, (2) by extraction from plants by means of alcohol or other solvent, or (3) as solidified masses or fossil resins in certain geological formations, *e.g.*, the Coal Measures. They are usually translucent, yellowish, amorphous bodies, with a peculiar odour. They are insoluble in water, but soluble in many organic liquids, *e.g.*, benzine, turpentine. They melt if heated, and are combustible, giving a smoky and luminous flame. In composition they appear to consist chiefly of a mixture of different acids closely allied to bodies of the terpene class, and probably derived from them by oxidation. They merge into the balsams and the soft oleo-resins, there being no essential or fixed difference. Many are used for the preparation of varnishes, as copal, dammar, etc. Others find application in medicine, *e.g.*, guaiacum, copaiba, etc., while others are put to varied uses in the arts, as ordinary pine-resin, colophony, amber, frankincense, Canada balsam, benzoin, etc. [BALSAMIS.]

Resistance, in electricity, that property of a conductor in consequence of which energy must be expended and converted into heat in order that a current may be maintained in that conductor. It is seen from Ohm's law that this resistance is equal to the ratio of the electromotive force to the current strength, and it follows that it is constant for any conductor, provided the conditions are similar, irrespective of the strength of the current. The dimensions of resistance are LT^{-1} , the same as those of velocity, so that the unit of resistance in the absolute electromagnetic system is a velocity of one centimetre per second. The practical unit, the ohm, is 10⁹ times this, and the concrete standard ohm, with which other resistances may be compared, is defined by the Board of Trade as "the resistance offered to an unvarying electric current by a column of mercury at the temperature of melting ice 14·4521 grammes in mass of a constant sectional area, and of a length of 106·3 centimetres." The resistance of a conductor of given material is directly proportional to its length and inversely proportional to its sectional area; the resistances of conductors of similar shape but different materials vary widely. That of most conductors increases with rise of temperature, but the reverse is the case with carbon and electrolytes. It has been found in the case of most pure metals, with the exception of iron and mercury, that the resistance at any temperature $t^{\circ}C$. is equal to $r(1 + 0\cdot003824t + 0\cdot00000126t^2)$, where r is the

resistance at 0°C . This formula is true between the limits 0° to 100°C . Observations of Sir James Dewar and Professor J. A. Fleming on the resistance of metals at very low temperatures indicate that at the absolute zero (-273°C .) metals would be perfectly good conductors and have no resistance at all. In the case of certain alloys, such as German silver, platinum silver, manganin, and others, the variation of resistance with temperature is very small. These alloys are therefore used for the construction of coils of wire, having certain definite resistances and known as resistance coils, which are used for measuring and comparing the resistances of other conductors. A number of coils connected in series having the junctions joined to brass blocks, and being put in a suitable case, constitute a resistance box. By inserting conical brass plugs between the brass blocks (where grooves are made to fit the plugs) any of the coils may be short-circuited, and the total resistance will be the sum of the resistances of those coils which are unplugged. The resistance of a conductor may be measured in various ways: (1) By observing the deflection of the needle of any galvanometer in circuit with an unknown resistance and a constant battery, and then producing the same deflection by substituting an adjustable resistance whose value is known; the resistance of the conductor will equal that of the known resistance. (2) By measuring the current produced in a conductor by a known difference of potential; the resistance of the conductor in ohms will be equal to the potential difference in volts divided by the current in amperes. (3) By Wheatstone's Bridge or Balance, and by numerous modifications of these methods.

Resolution of Forces is the undoing of what is done when we compound two forces into one. Let AC (Fig. 1) be a force, and draw any

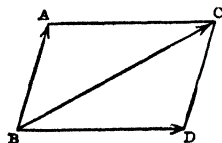


FIG. 1.

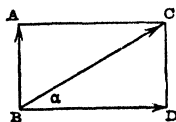
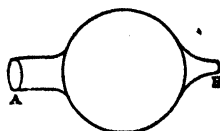


FIG. 2.

parallelogram, $ABDC$, having BC as a diagonal, then BC is equivalent to two forces, BD and BA , or BC can be resolved into those two forces, the directions of which may be chosen at will. It is very often extremely convenient to resolve a force into two components at right angles to each other. Let ABD (Fig. 2) be a right angle, and $CBD = \alpha$; then BD and BA are the components as before, but $BD = BC \cos \alpha$, and $BA = BC \sin \alpha$. Although a force may be resolved into two others in an infinite number of ways, practically, when the direction of the one is chosen, the other is always taken at right angles to it. When dealing with forces in space, it is usual to resolve them in three directions at right angles to each other.

Resonators, instruments for reinforcing any particular sound. A jar containing air will emit

a certain note if the air within it is set in vibration, and this note depends simply on the size of the jar. Suppose a tuning-fork giving out the same note is brought near to it, the air in the jar will be set in motion and will vibrate synchronously. The sound is therefore reinforced, and the jar acts the part of a resonator. If, however, the vibrations of the tuning-fork do not synchronise with those of the jar, the latter does not begin to sound, and so no reinforcement takes place. If a composite sound occur near a resonator, the latter will begin to sound, provided one of the notes of the composite sound synchronises with it. Hence that one note is picked out and rendered more powerful than the others. Helmholtz used this principle in studying complex sounds. His resonators were globes of air with a small orifice, B , which could be placed in the ear. A large opening, A , received the sound-waves. By means of a number of these spheres capable of giving out different notes he was able to resolve any sound into its simple components.



HELMHOLTZ'S RESONATOR.

Resorcin, or **RESORCINOL**, consists chemically of dioxybenzene $C_6H_4(OH)_2$. It hence has the same composition as hydroquinone, from which it, however, differs in the positions of the hydroxyl groups with regard to the benzene ring. [BENZENE.] It may be obtained from a number of resinous substances and from Brazil wood, but it is now almost entirely prepared synthetically from artificial products. It forms crystals of the rhombic system, which melt at 180° , and is soluble in water and most organic solvents. It may be recognised by a dark violet coloration, which is given it by a solution of ferric chloride. It is very largely used in the production of dyes, many brilliant colours being obtained from compounds derived from resorcinol, e.g., the well-known fluorescein eosin and allied compounds.

Respiration, the taking in of oxygen and giving out of carbon dioxide, which is an essential function of all living protoplasm, though especially connected with its catabolism. In anaërobic plants, such as some of the schizophytic ferments, the oxygen can be obtained from its compounds; but all aerobic plants—that is, the vast majority of the Vegetable kingdom—obtain it free from the atmosphere. As there are degrees of respiratory activity among animals, so the respiration of plants more nearly resembles that of torpid or cold-blooded animals, far smaller volumes of gas being involved in the process than in assimilation—that is, the action of chlorophyll. This has given rise to the mistaken statement that vegetable respiration is the converse of that of animals, by which is only meant that the total effect upon the atmosphere of green plants when in sunlight is the converse of that of animals. Respiration does not cease in the dark, nor is it in any way dependent upon chlorophyll, so that its effects are well seen in such cases as fermentation by yeast, or germinating seeds,

where no chlorophyll is present. The cuticle is permeable to gases; but there are no special organs of respiration among plants.

Respiration, in ANIMALS. In the article on the LUNGS the structure of those organs has been described, and it has been seen how the ultimate air passages consist of a membrane supporting a network of capillary blood-vessels, and lined with flattened epithelial cells. The way in which the blood, in its passage through the lungs, is thus brought into intimate relation with the air in the pulmonary alveoli, in such a way as to facilitate the interchange of gases between blood and air, has thus been made manifest. Under the present heading it will be necessary to allude to the mechanism by which the movements of inspiration and expiration are effected, to the changes which are brought about in the chemical constitution of air by respiration, to the changes simultaneously brought about in the blood, to the influence of the nervous system on respiration, and to certain other topics.

Mechanism of the Respiratory Movements. The act of inspiration consists in an increase in the capacity of the chest, brought about mainly by the contraction of the diaphragm (the descent of which muscle increases the vertical diameter of the chest), and also in part by the raising of the ribs (which are, speaking generally, attached obliquely between the spine and the sternum) in such a way that their elevation increases the lateral and antero-posterior diameters of the chest. The raising of the ribs produces a thrusting forwards of the sternum, while at the same time each rib rotates about an axis drawn from the head of the rib behind to the sternum in front, an increase in the lateral diameter of the chest resulting from such movement, which has been compared to that produced in raising the handle of a bucket. The angle between the costal cartilage and the bony part of the rib is, moreover, somewhat opened out when the rib is raised, thus effecting a slight additional increase in the antero-posterior diameter of the chest. The chief muscle of ordinary inspiration, then, is the diaphragm, the most important auxiliary muscles being the external intercostals, which are concerned in raising the ribs. In forced inspiration a number of other muscles are brought into play (scalene muscles, sterno-mastoid, pectorals, etc.). It has already been explained [LUNGS] how the external surface of the lung follows the movements of the chest wall, the atmospheric pressure causing distension of the elastic lung tissue. When the various muscles concerned in increasing the capacity of the thorax cease to act, the elastic force of the distended lung comes into play, and it will thus be readily understood that expiration is in the main a recoil from the state of tension produced by inspiration, and that little or no muscular power is required to bring about the change from enlargement to diminution of the thoracic capacity in ordinary breathing. In forced expiratory movement, however, certain muscles are brought into action; the abdominal muscles which contract and press the viscera contained in the abdomen upwards against the diaphragm, and muscles which depress

the ribs assist them in bringing about lessened capacity of the chest. The quantity of air drawn in or expelled in ordinary inspiration or expiration amounts to about 30 cubic inches (tidal air). The amount in excess of this which can be inhaled by the deepest possible inspiration is termed complementary air. In expiration, after the expulsion of the tidal air, a further quantity of air can be breathed out by forced expiration (reserve air). The air remaining in the chest after the deepest possible expiration is termed the residual air, and its amount in an adult of average development has been estimated at about 100 cubic inches. The respiratory capacity is tested by an instrument called a spirometer, which is adapted to indicate the amount of air which can be expelled by forced expiration after a deep inspiration has been made. In an adult man of average height the respiratory capacity is about 225 cubic inches. The respiratory movements are repeated in the adult about 18 times a minute, and in health they bear a tolerably constant proportion to the pulse-rate, some four or five pulse-beats occurring in correspondence with each respiratory cycle.

Changes brought about in the Air and in the Blood by Respiration. The expired air differs from the inspired air in the following respects:—Its temperature is somewhat increased, it contains about $\frac{1}{2}$ per cent. less oxygen, and the carbonic acid is increased to very nearly the same extent that the oxygen is diminished. It has been estimated that an average man gives off about $\frac{1}{2}$ of a cubic foot of carbonic acid in the course of an hour. The expired air contains, moreover, an increased quantity of watery vapour and a very small amount of free ammonia and organic matter. In correspondence with these changes produced in the air by respiration, the blood in the capillaries of the lungs gains oxygen and loses carbonic acid, being changed from dark venous to bright arterial blood. It also becomes slightly cooler and somewhat more readily coagulable. As to the way in which the interchange of gases between the blood and the air in the pulmonary alveoli is brought about, it may be remarked that the ordinary diffusion of gases plays some part in the matter. As regards the taking up of oxygen, however, the affinity of the hæmoglobin of the blood for that gas is an important factor in determining its absorption. There appears to be reason, moreover, for supposing that the epithelial cells, which line the walls of the ultimate air-spaces of the lung, exercise some secretory action and so modify the ordinary physical laws of diffusion of gases.

Influence of the Nervous System on Respiration. Respiration is an involuntary act, although it can, to some extent, be modified by the influence of the will. It has been found that the nerve-centre which regulates the movements of respiration is situated in the medulla oblongata, close to the point at which the pneumogastric nerves originate. The action of this nerve-centre is modified by impressions, transmitted to it from the peripheral terminations of the pneumogastric nerves, which travel along these nerves to the centre. It is also modified by the condition of the blood circulating

in the medulla. The impulses determining the ordinary respiratory movements are transmitted from the medulla along the phrenic nerves to the diaphragm, and along the intercostal nerves to the intercostal muscles.

It remains only to allude to *dyspnea*, the condition of difficult breathing brought about when there is interference with the due aëration of the blood. This may result from diseased conditions in the lung, or mechanical interference with the respiratory movements, or failure of adequate supply of oxygen. The blood in any of these events is imperfectly aërated, and such blood circulating in the medulla stimulates the respiratory centre to unwonted activity, and the forced respiratory movements of *dyspnea* occur. [APNŒA.] If the cause of the difficulty is not removed, the *dyspnea* passes into what is known as *asphyxia*. [ARTIFICIAL RESPIRATION.]

Respiratory Trees are two or more outgrowths from the intestine of many Sea-cucumbers (Holothurians) which perform the function of respiration. They occur in all Holothurians except the deep-sea group of *Elasipoda* and the *Apneumona*.

Resurrection, a word generally used with reference to the Christian theological belief of a reunion of the body and soul in a future state of existence. The many physical difficulties as to the reuniting of the material particles of our present bodies are to some extent obviated by the explanation given by St. Paul, and by his theory of a spiritual body, which he compares to the analogy of a sown grain of corn and that which grows from it. The resurrection of Christ is one of the main grounds upon which a belief in the resurrection of the body is based. A belief in the immortality of the soul, with or without the belief in a continued identity of body, has been and is widely spread throughout all times and among most races, from the belief of the Australian native that he will come back to earth a white man, or the Oriental doctrine of transmigration and progress of the soul, to the belief of spiritualised materialism that the principle of life is indestructible, though personal identity will be lost.

Retford, or EAST RETFORD, a town of Nottinghamshire, England, on the Idle, a left hand tributary of the Trent, 18 miles N.N.W. of Newark. St. Swithin's, or the Corporation Church, formerly of even greater extent, is a fine structure in the Perpendicular style. The central tower is supported on four massive Early English arches and the nave is separated from the aisles by arcades of five bays. The other leading buildings are the grammar school, founded by Edward VI., the modern Romanesque Town Hall, the open space beneath which provides accommodation for the butter and poultry market, the corn exchange and court-house. The industries comprise iron-founding, indiarubber works, paper mills and corn mills. The town received its charter of incorporation from James I. West Repton lies on the opposite side of the Idle. Pop. (1901), 12,340.

Rethel, a town in the department of Ardennes, France, on the Aisne, 24 miles N.E. of Rheims. It was capital of the old district of Rethelois which formed part of the ancient province of Champagne (now comprising the departments of Marne, Ardennes, Aube and Haute-Marne). It has manufactures of textiles, especially of merinoes, of which it has made a speciality. Pop. (1901), 7,434.

Reticularia, a synonym for *Foraminifera*.

Retina. [EYE.]

Retinitis. Inflammation of the retina is met with in the subjects of Bright's disease (albuminuric retinitis), in diabetes, and in syphilis. Pigmentary retinitis is a remarkable disease affecting the retina and choroid, which, when it appears, usually manifests itself in several members of the same family. This is probably the only genuine retinitis, the inflammation in the albuminuric and syphilitic forms, if it should occur, being rather a consequence of irritation due to what have been called "adventitious deposits." All these conditions are detected by the use of the ophthalmoscope. In detachment of the retina that membrane becomes separated from the choroid coat by the effusion of fluid between the two; it is met with in conditions of extreme myopia. There are two leading symptoms of pigmentary retinitis—the gradual contraction of the field of vision caused by the advance of the disease and (which is very characteristic) the condition known as night-blindness, in which the patient, while able to see pretty well by daylight, is almost incapacitated towards night by reason of failure of sight. Treatment is difficult, but the prolonged administration of iron will arrest the progress of the complaint. It is a malady that should be treated under expert advice.

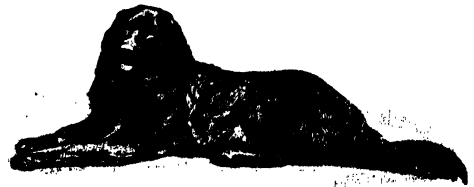
Retirement, in the Navy and Army, is the withdrawal from service of commissioned officers with the retention of more or less of their pay. Retirement may be either voluntary after the completion of a certain number of years' service, or compulsory at a later date, the period being fixed from time to time by Royal Warrant or other authority. In the Army voluntary retirement is possible after 12 years' service for officers below the rank of Major-General, and is compulsory at ages fixed according to rank. In the Navy Admirals and Vice-Admirals must retire at 65, Rear-Admirals at 60, Captains at 55, Commanders at 50, and Lieutenants at 45, and they may retire at option five years earlier in each class. In the Civil Service retirement is optional at 60 and compulsory at 65. In cases of permanent illness after a few years' service a small pension accrues, but if the stipulated term has almost but not quite been reached a bonus, reckoned on a poundage for every year served, is usually paid to the retiree if of exemplary conduct. The whole question of compulsory retirement at an age when healthy persons have still the capacity and the will for years of efficient service is yet in a most unsatisfactory state, which has been accentuated by the abominable American doctrine of "too old at 40." It is certainly unpleasant to think that, in the Civil Service, for instance, the majority

of juniors view with disfavour the continuance in office of *employés* who have reached the age of 60.

Retort, a vessel of glass, earthenware, or metal—according to the purpose for which it is required—employed with the object of distilling or effecting decomposition by the application of heat. Glass vessels are commonly used for the distillation of liquids. They have the shape of a flask with a long neck. The liquid to be distilled is placed in the flask and, heat having been applied, the distillate condenses in the cold neck of the retort and passes to the receiver, a globular vessel into which the neck of the retort is projected. Cold may be applied to the neck by means of wet cloths or otherwise in order to promote condensation. Earthenware retorts are needed for excessive degrees of heat, lead retorts for the preparation of hydrofluoric acid, platinum retorts for strong sulphuric acid and iron retorts for the destructive distillation of coal.

Retriever, a sporting dog trained to find and bring back killed and wounded game. There are two breeds, and of both the Newfoundland seems to have been the origin. Crosses with the setter gave rise to the wavy-coated form, while the curly-coated retriever was produced by an infusion of poodle, or water-spaniel blood. These dogs are marked by great intelligence and are generally good-tempered. They are also excellent watch-dogs. Other breeds, notably terriers, have been trained to retrieve. The breaking of retrievers demands great intelligence, patience and knowledge of dog-nature. Sir Henry Smith, for whom the only retriever is the flat-coated breed, makes this quite clear in his invaluable book on *Retrievers and How to Break them*. He says that "a perfect retriever, full of dash and a quick worker, a dog that goes out at a gallop and comes back at a gallop, keen and persevering, and absolutely steady at heel till told to go, is worth quite fifty guineas." He maintains that retrievers are "singularly docile and tractable, easy to teach and eager for instruction, and the reason one meets with so few good ones and so many bad is simply that their preliminary education—which should begin when the dog is very young—has been to all intents and purposes absolutely neglected." A capable breaker ought to be able to decide "how a young dog will turn out and diagnose his future long before he has seen a bird fall on the heather or the stubble. But the vast majority of keepers do not recognise this. They seem to think little or nothing can be done till the shooting season comes round." Of course the result of such dilatory tactics is obvious. When the 12th of August arrives the dogs are useless and receive the blame that should fall on the ignorance or indolence of the keeper. In Sir Henry Smith's opinion, "a puppy thoroughly well grounded and properly handled, say from the age of seven or eight months, should prove of use and do some fair work the very first day he is shot over, and be brought to something like perfection at the end of his first season." No attempt should be made to hurry the training of a dog. "Far better take him out alone and shoot two or three birds over him. First lessons should never be long, and young dogs

should never be kept at work more than an hour or two at a stretch. Even if he has been well grounded and is ready for work, giving him a 'good doing' is a fatal error. As he gets tired, so he gets careless, drops his birds, lays them down, and rolls on them, or commits some other fault. If he waits till told to go, seeks for, and fetches back at once even a brace of birds, he has had a capital lesson and earned his dinner." But, before a retriever's education begins, "he should be taught to lie down when you hold up your hand or say 'Down,' and remain lying while you walk or run away from him till you beckon him up by a wave of your arm. Two or three lessons of ten minutes each will teach him to lie down. Put him in position, and check him when he offers to get up; praise him when he is still; gradually increase the distance you walk from him; go out of his sight; come back and reward him when you find him in his place. Should he follow without leave, chide him, take him back, put him down again firmly and caution him. Do not keep him in position too long at first, and

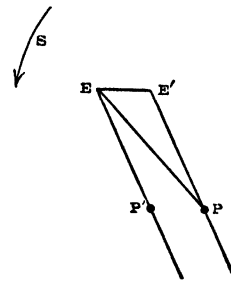


RETRIEVER (FLAT-COATED)

above all things never make him lie down when he gallops back to you. A dog should bound back to his master with his head as high as he can carry it—as he ought to have it when retrieving 'to hand.'

Retrograde. The planets appear to move in an extremely irregular way among the fixed stars.

Sometimes their motion is in the same direction as that of the sun, in which case it is said to be direct, while at other times it moves in the opposite direction and is said to be retrograde. These irregularities are due to the fact that the earth is moving, but to the observer it seems as though all the motion is due to the planet. Imagine a planet, P, to be viewed from the earth, E, and to remain at rest while the earth moves a short distance, E E'. It will then appear the same as though the observer were still at E, but the planet had moved to P', the line E P' being parallel to E' P. The direction of motion of the planet will therefore appear to be the same as that of the hands of the clock, but the sun appears



to move contra-clockwise among the stars; hence the planet in this case has a retrograde motion. The planet, however, does not remain at rest, and so the final result depends on the sum of the effects produced by the motion of both earth and planet.

Retz, FRANÇOIS PAUL DE GONDI, Cardinal de, was born at Montmirail, département of Marne, France, about September 19th, 1613. He was the nephew of an Archbishop of Paris and son of a French general. He was partly educated by the famous Vincent de Paul, and in his early years had some reputation as a gallant and duellist, notwithstanding which he was destined for the Church, in which several members of his family had gained high preferment. In 1632 (or possibly 1636) he published his *Conjuration de Fiesque*, not untinted with revolutionary sentiments. Ambitious and a born intriguer, he cleverly ingratiated himself into the favour of Louis XIII. and was made coadjutor to his uncle, being consecrated under the title of Archbishop of Corinth (1644). His intrigues against Mazarin made him popular in Paris, and he took a leading part in the civil strife known as the Fronde, being the soul of the resistance of the *bourgeoisie* and Parliament against the faction of Mazarin, whom he outmanœuvred and whose exile he procured in 1651. Later in the same year he was designated Cardinal, but in 1652 his intriguing became too dangerous, and he was arrested and imprisoned, first at Vincennes and then at Nantes, but managed to make his escape to Italy, where he resumed the title of Archbishop of Paris which he had renounced, receiving the pallium from Innocent X. He enjoyed the favour of Alexander VII., travelled in different countries and laboured for the restoration of Charles II. to the throne of Great Britain. On Mazarin's death (1661) he was permitted to return to France, and, having again surrendered his claim to the archbishopric of Paris, received from Louis XIV. the abbacy of St. Denis. The last seventeen years of his life were largely spent in retirement, part of which was devoted to the writing of his *Mémoires*, published after his death, which took place at Paris on August 24th, 1679.

Retz, or RAIS, GILLES DE, Marshal of France, was born in Brittany in 1404. He was trained for a military career and became one of the most faithful followers of Joan of Arc. He was present at the coronation of Charles VII. in Rheims on July 17th, 1429, and was created on the same day Marshal of France. Possessed of one of the largest fortunes of his time, he gradually withdrew from public life and embarked upon a career of lavish expenditure in retirement on his estates. It is probable that his mind had become affected by the peace at which he lived—at least it is charitable to suppose so, for he grew addicted to the study of alchemy and the practice of black magic. Fearing neither God nor man, he is said to have compassed the deaths of more than 200 children, some of whom perished by his own hand, sacrificed to his infamous service of the Devil. The Duke of Brittany refused to execute the interdict of Charles VII., but was at length forced by the clamour of public opinion to

order Retz to be tried. The tribunal sentenced him to death and he was strangled and burned at the stake at Nantes on October 26th, 1440. This monster of iniquity is said to have made almost an edifying end. Some doubts have been thrown upon the authenticity of the records of his career, while others have seen in him the historical prototype of Blue Beard.

Reuchlin, JOHANN, whose name was Hellenised as KAPNIO (by which, however, he is never called), Reformer and scholar, was born, of humble parents, at Pforsheim, in Baden, on February 22nd, 1455. He studied at Freiburg and Basel, where he became bachelor of philosophy and published a Latin dictionary, afterwards learning Greek in Paris and Italy. Law he studied at Orleans and Poitiers and returned to Germany in 1482. Appointed private secretary to Eberhard I. of Württemberg, he was taught Hebrew by Jacob Lohaus, the physician to the Emperor Frederick III. He was afterwards employed on a diplomatic mission to Rome (1498) and on his return was made judge to the Swabian League and also continued his studies in the mystic Jewish philosophy, concerning which he wrote his *De Verbo mirifico* (1494) and *De Arte cabalistica* (1516). The outstanding service of his career was rendered when he opposed the scandalous project of the Dominicans of Cologne to destroy all Hebrew books. In his *Epistole obscurorum virorum* he covered the reactionaries Pfefferkorn, a Jewish pervert, and the Inquisitor Hoogstraten with lasting ridicule. In 1521 he was made Professor of Hebrew at Inkoistadt, and died at Liebenzell, 20 miles west of Stuttgart, on June 30th, 1522. He was the author of *De rudimentis hebraicis* and translated the Penitential Psalms. The prominence attached to the controversy in respect of the destruction of Jewish books helped to prepare the way for the Reformation, of which, next to Erasmus, Reuchlin was the finest scholar and to which (though possibly not expressly accepting it himself) he gave his nephew, Philip Melancthon.

Réunion—called before the Revolution ÎLE DE BOURBON—an island belonging to France, in the Indian Ocean, 130 miles W. of Mauritius and 420 miles E. of Madagascar. It is 38 miles long, 28 broad, and contains 970 square miles. The island is of volcanic origin and is traversed from north-west to south-east by a mountain chain dividing it into the Leeward section in the south-west (*l'artie sous le vent*) and the Windward in the north-east (*Partie du vent*). The highest peaks are Piton des Neiges (10,070 feet), Grand Bénard (9,500 feet) and Piton de la Fournaise (8,612 feet), the last-named being a volcano still active, some of whose eruptions are marked by an enormous outflow of lava. The streams are all short and rapid, the chief being the Mât, Des Galets, St. Etienne, Des Marsouins and Des Remparts. The climate is fairly healthy and there is a sanatorium in the interior at Salazie. Near the coast the soil is fertile, yielding sugar, coffee, cloves, maize, tobacco, vanilla, tapioca, tea, rubber, cinchona and other tropical plants. The island, which has belonged to France since 1764, is administered by a

governor assisted by a council and is represented in the French legislature by one senator and two deputies. The capital is Saint Denis (27,392), other towns being St. Pierre (28,885), St. Paul (19,617), and St. Louis (12,541). The island was the home of the extinct dodo. Pop. (1902), 173,315.

Reus, a town of the province of Tarragona, Spain, whose port, Salou, is 4 miles from the Mediterranean. Though dating from the middle of the 13th century, it owes its prosperity to the small colony of English that settled in it in 1750 and established manufactures of woollens and leather and trade in wines and spirits. The principal industries are cotton-weaving, silk-spinning, distilling, and the making of machinery, hats, soap, leather, preserves and earthenware. The chief building is the Gothic church of San Pedro, from the lofty octagonal tower of which a remarkable view may be had. Marshal Prim and Mariano Fortuny were natives of Reus. Pop., 27,500.

Reuss, the name of two principalities of Central Germany ruled by different lines of the same family. All the males of each line are called Heinrich and are distinguished by numbers, a fresh series starting with each fresh hundred in the elder and each century in the younger branch. It consists of (1) Reuss-Greiz (ruled by the elder line), of 122 square miles, on the left bank of the Saale and traversed by the Elster, and (2) Reuss-Schleiz with Reuss-Lobenstein-Ebersdorf, containing 319 square miles. The former of these is largely pasture-land, feeding many horned cattle and sheep and producing potatoes, flax, and some hops, while the chief manufactures are woollen, linen, and cotton-weaving. The latter is well-wooded and fertile, and produces much grain. Iron is worked, and there is quarrying of roofing-slates. The inhabitants of both are mostly Protestant. Pop. of Reuss-Greiz, otherwise called **REUSS THE ELDER**, with Greiz (22,346) as capital (1900), 68,396; of Reuss-Schleiz, otherwise **REUSS THE YOUNGER**, with Gera (45,634) as capital, 138,993.

Reuter, FRITZ, humorist, was born at Stavenhagen, in Mecklenburg-Schwerin, Germany, on November 7th, 1810, and studied at Rostock and Jena Universities, joining one of the numerous student societies then in existence. When these were proclaimed by Metternich in 1833, Reuter's democratic utterances led to his arrest and he was condemned to death, a brutal sentence commuted to one scarcely less brutal—namely, 30 years' imprisonment, of which term he actually served seven. Incarceration ruined his health and a stomach trouble provoked a constant thirst, which he as constantly quenched with strong liquors. After leaving jail he took to farming and then taught gymnastics. He published his first volume of humorous poems in 1853; they were written in Low German dialect and became very popular. A second speedily followed, and his enormous success placed him in the front rank of the humorists of the 19th century. In 1859 the first of his *Olle Kamellen* series of tales, which are among his

best productions, appeared; in 1862, *Ut mine Festungtid*, and in 1864, *Ut mine Stromtid*, his best work. In 1863 he settled at Eisenach, and died there on July 12th, 1874.

Reuter, BARON PAUL JULIUS DE, was born in 1816 at Hesse-Cassel in Germany. He started commercial life in his uncle's office and, making the acquaintance of Professor Gauss, the telegraphic experimentalist, became identified with the beginnings of practical telegraphy. When in 1849 the first line on the Continent, between Aix-la-Chapelle



BARON DE REUTER.

and Berlin, was completed, Reuter settled in the former place and began collecting and transmitting news. To obtain this he employed couriers and made use of carrier-pigeons and the railways, but being hampered by the press censor in 1851, when the first submarine cable was laid between Dover and Calais, he transferred his headquarters to London, occupying himself mainly with the distribution of commercial intelligence. In 1858 he undertook to supply the British press with foreign news, which had hitherto been inadequately reported. For this purpose he established agents in the chief European capitals and afterwards sent his representatives to all parts of the world. Through his agency the first tidings of the assassination of President Lincoln (1865) and of the defeat of the British at Majuba Hill (1881) reached England. In 1865 he converted his business into a limited liability company, of which he remained chairman until 1878. In addition to obtaining and working various concessions for telegraphic cables, Baron de Reuter, whose title was conferred by the Duke of Saxe-Coburg and Gotha in 1871 in recog-

nition of his public services, in 1872 was granted the exclusive privilege of constructing railways and developing the natural resources of Persia by the Shah. As the result of various intrigues the concession was annulled and in its place he received a concession for the formation of a State bank which was incorporated as the Imperial Bank of Persia by royal charter on September 2nd, 1889. He married Ida, daughter of S. M. Magnus of Berlin, in 1845 and died at Nice on February 25th, 1899.

Reutlingen, a town of Württemberg, Germany, on the Eschatz, 20 miles S. of Stuttgart. St. Mary's Church, dating from the 13th century, is a fine Gothic structure, with a tower 243 feet high. The manufactures include textiles, machinery, leather, paper, hardware, lace, ribbons and other goods. A free Imperial town in 1243, Reutlingen afterwards became a member of the Swabian League and was among the earliest towns to accept the Reformation. It was annexed to Württemberg in 1802. Pop. (1900), 21,481.

Revel, or REVAL, seaport and capital of Esthonia, Russia, on a small bay in the Gulf of Finland, 206 miles W.S.W. of St. Petersburg. It was once strongly fortified and part of the fortification remains. The Governor's residence, the Town Hall, guild-house, the cathedral, the church of St. Olaus, with one of the tallest spires in the world, St. Nicholas's Church, the church of the Holy Ghost, the Museum of Baltic Antiquities and Art, the Ritterhaus (or House of the Knights), the public library, and the House of the Schwarzhäupter (Black Heads) with pictures and treasures, are the chief buildings. The harbour, though difficult to enter, is deep and admits ships of war and does an important trade. The principal exports are hemp, flax, timber, corn, spirits and goat-hair, and there is a large import trade. The industries are insignificant, but Revel is a popular resort for sea-bathing. It is also the administrative headquarters of the Baltic lighthouses, a seat of a branch of the Board of Admiralty and a naval station of the second class. Pop., 64,578.

Revelation, BOOK OF, also called the APOCALYPSE, the last book of the New Testament, and generally accepted as embodying visions seen by St. John the Divine during his banishment in the Isle of Patmos towards the end of the 1st century. It was practically accepted as genuine by the early Christians, but in the 3rd century doubts as to its canonicity began to be entertained by the Fathers of the Eastern Church, among others by Dionysius of Alexandria, who held that it was the composition of another John than the Apostle of this name. The Western Fathers, on the other hand, were practically unanimous in favour of the traditional authorship, excepting Jerome, who seemed disposed to remove it from the canon—a view that was adopted, at the time of the Reformation, by Erasmus and Luther. Modern criticism would appear to incline to the opinion that the literary unity of the Apocalypse is untenable, but that the Book was probably written by one man who, in current phrase, acted as editor and embodied

various fragments into one narrative. On the other hand, the artificial character and the uniformity of the language and style indicate a relative unity of structure, while there is almost complete agreement on the point of its being written at the end of the 1st century. The Book has been the cause of countless theories and methods of interpretation; some commentators considering it to be a contemporary history of the Church, others the allegorical history of a period finished at the time of its composition, and others a history of what shall be hereafter.

Revenue, that which comes in through the possession of property; but the term is generally used to cover national income from whatever source derived. Thus in the United Kingdom the sources of revenue are Taxes and other duties, Customs, Excise, Post Office, Telegraphs, Stamps, Crownlands, Mint, and miscellaneous sources, amounting in the aggregate to nearly £150,000,000.

Reverberatory Furnace, a class of furnaces largely employed in the smelting of various metals—*e.g.*, lead, copper, tin, etc. They differ in details according to the special purpose for which they are intended, but all are made with low arched roofs, which deflect the flames and products of combustion of the burning fuel down upon the surface of the ores, etc., which are being treated. These are therefore heated directly by the furnace flames, and, owing to the presence of reducing gases, as CO, etc., in the combustion products, are partially or wholly reduced to the metallic state.

Revere, PAUL, patriot, was born in Boston, Massachusetts, on New Year's Day, 1735. He was of French descent, his grandfather having left Europe with other Huguenot refugees. He was a goldsmith and also an expert copper-plate engraver and, about the time of the Revolution, published several plates in the nature of political squibs. He formed one of the party who emptied the tea-chests into Boston Harbour and also belonged to the select society of patriots who secretly watched the movements of the British soldiery and reported to headquarters, their own doings being just as diligently reported to the British General Gage by one of their number who turned traitor. On the evening of April 18th, 1775, the band observing signs of activity in the British barracks, Revere at midnight crossed the river to Charlestown and rode post-haste to Lexington, rousing the country as he went and barely escaping capture. At Lexington he was joined by Dr. Samuel Prescott and William Dawes, and the three pushed on with the object of alarming Concord, but at Lincoln he and Dawes were seized and sent back to Lexington. This midnight ride was the subject of one of H. W. Longfellow's best-known poems. He saw plenty of service during the war, being usually requisitioned for jobs requiring pluck, ingenuity and presence of mind, and became lieutenant-colonel of artillery. After the Independence he returned to his avocation of goldsmith, afterwards building a foundry for the casting of church bells and bronze cannon. In 1801 he still further enlarged his business,

establishing works at Canton, Massachusetts, for rolling copper and forming the Revere Copper Company. He was the first to smelt copper ore and to refine and roll copper into bolts and sheets in the United States. He died at Boston on May 10th, 1818.

Reversion, the estate which reverts or returns to a grantor after the grant of a particular estate or interest in the property has terminated. This reversion is founded on the principle that where a person has not parted with his whole estate or interest in the land, all that which he has not parted with remains in him, and the possession of the land reverts or returns to him upon the determination of the preceding estate—i.e., the estate which remains after the grant. In other words, it is "the residue of the estate left in the grantor."

Revivalist, one who takes part in revivalism, which may be defined as an awakening and stirring of religious feeling. Many such movements have taken place, among them being the Reformation, the movement set on foot by John Wesley, George Whitefield, and others; but the name is usually applied to those who took part in the movement initiated in the United States of America in 1858, and which spread to Scotland and Ireland, and to some extent to England. Among noted revivalists were D. L. Moody and Ira D. Sankey, who visited Great Britain in 1873, and Dr. Torrey and C. Alexander, who conducted a campaign in the United States in 1905, with markedly less successful results than had attended the efforts of their forerunners. The Oxford Movement, though sometimes described as a Catholic, or Anglo-Catholic Revival, belongs to a totally different category of religious sentiment and emotion.

Revolution, a radical change in social or government conditions, often involving the overthrow of a dynasty and the rejection of a long-established political system. The chief movements to which the term has been applied are the "glorious" Revolution when, in 1688, James II. left England and constitutional government was restored after William of Orange landed at Torbay in November, 1688, William and Mary being proclaimed sovereigns and Parliament passing the Bill of Rights in the following year; the American Revolution, when the thirteen original colonies threw off their allegiance to England in 1776 and their independence was formally recognised by treaty in 1783; the Great Revolution in France when the *ancien régime* was abolished for ever. This began with the capture of the Bastille in 1789, proceeded to the execution of Louis XVI. and Marie Antoinette in 1793 and the Reign of Terror and closed in 1795 with the setting up of the Directory (or, in 1799, with the establishment of the Consulate). Less momentous revolutions in France were those of 1830, when the Bourbon Charles X., and 1848, when the Citizen King Louis Philippe found it necessary to leave the country. The Revolution following the *débâcle* of Sedan in 1870 was of the most far-reaching importance, since it resulted in the founding of the Third Republic, which has secured a firm hold on

the people and has every appearance of solidarity and permanence. Revolutions in South America, having been as plentiful as blackberries, need not otherwise be mentioned.

Revolver, a repeating fire-arm, now generally a pistol, possessing a single barrel, and a cylinder holding five or more cartridges. By means of mechanism connected with the lock this cylinder revolves, bringing the charged chambers successively into line with the barrel. In an earlier form the barrel, which was four-fold, used to revolve, and so bring each aperture beneath the hammer. Colonel Samuel Colt (born at Hartford, Connecticut, July 19th, 1814; died there, January 10th, 1862) made such improvements in the mechanism as brought the instrument into general use, and since the introduction of the system of breech-loading and the employment of metal cartridges the weapon has been greatly improved and modified. Among the improvements may be mentioned self-cocking, automatic ejection of spent cartridges and safety-bolts to prevent accidental discharge. The revolver principle has also been extended to some types of quick-firing guns. The principle itself is of some antiquity. Owing to the number of suicides effected by means of the revolver, public opinion in the United Kingdom has condemned the facilities which exist for the sale of these weapons to all and sundry, and it has been repeatedly urged that their sale should be accompanied by at least similar, if not more satisfactory, safeguards to those which are in force in respect of the sale of poisons.

Reward, a compensation or return for something done. It has a legal significance, for, by a statute passed in George IV.'s reign, in order to encourage the apprehension of offenders in certain cases (and in substitution of previous enactments) it is provided that when a person shall appear to have been active in or towards the apprehension of anyone charged with murder, or with a felonious and malicious shooting or attempting to shoot, stabbing, cutting, or poisoning, or administering anything to procure miscarriage, or with rape, burglary, or felonious house-breaking, bullock-stealing or sheep-stealing, or with being accessory before the fact to any of such offences or to receiving any stolen property, a reasonable compensation shall be awarded him for his expense, exertion, and loss of time, and in case a man be killed in such attempt the court may order compensation to his wife or relatives.

Reybaud, MARIE ROCH LOUIS, economist and politician, was born at Marseilles, France, on August 15th, 1799. With a view to a mercantile career, his father sent him on a voyage to India and the East, but he disliked trade and, on his return to Paris, settled down to literature. Results of his travels appeared in his *Syrie, Égypte, Palestine et Judée* (1834) and other works, besides an edition of D'Urville's *Voyage au tour du monde* (1833). Interested also in politics, he wrote for the *Revue des Deux Mondes* an important series of articles afterwards published in volume form as *Études sur les réformateurs ou socialistes modernes*

(1840). Yet the success of his life was made in pure literature by his humorous and satirical romance of *Jérôme Paturot à la recherche d'une position sociale* (1843). Elected Deputy for Marseilles in 1846, he sat with the Left Centre and soon afterwards became wholly reactionary, deriding the new ideas in his *Jérôme Paturot à la recherche de la meilleure des républiques* (1848), which did not repeat the success of its predecessor. Although continuing to act with the enemies of the Republic, he retired into private life after the *coup d'état*. Among his other works may be named *Marie Brontin* (1850), *La Vie à rebours* (1853), *L'Industrie en Europe* (1856), *Mathias l'humoriste* (1860), in addition to another admirable series of economic inquiries, *Études sur le régime de nos manufactures*. He died in Paris on October 28th, 1879.

Reykjavik. [ICELAND.]

Reynard the Fox, an epic fable of northern origin, in which animals figure, with the Fox as hero or villain, according to the point of view. Grimm tells us that all the Aryan races have beast fables, in which connection may be mentioned the cobra stories of Miss Bartle Frere's *Old Deccan Days* and *Brer Rabbit* of the negroes. The earliest versions were in Latin, of which the best—*Isengrimus* (Isengrim being the Wolf)—was written by an author unknown about the middle of the 12th century. The Franks introduced *Reynard* into France, where it somewhat changed its nature and became a satire partly social, partly political. The best French versions, which run to inordinate length, date from the middle of the 13th to the middle of the 14th century. The oldest High German version, commonly called *Reineke Fuchs*, was an adaptation, made in the beginning of the 13th century, of a version in French of 1180. A Low German version appeared at Gouda in 1479, and was translated by William Caxton in 1481, and in 1498 Backhuysen, of Rostock, published a poetic version in Low German called *Reynke de Vos*, founded upon an old Dutch prose version and relating the adventures of Reynard at the Lion's Court, where his wit and resource carried the day. The fable is also found in Danish, Swedish, and other languages. It is easy to see how, under the guise of fable, much pungent satire might be directed at the Church and other societies that had made themselves more or less notorious and unpopular. At the same time many of the versions possess literary attributes of high quality.

Reynolds, GEORGE WILLIAM MACARTHUR, author and politician, was born in Sandwich, Kent, on July 23rd, 1814. He was educated at Ashford and the Royal Military College at Sandhurst, but, a military career becoming distasteful, he ceased his studies and withdrew to France, where he acquired a thorough knowledge of the language and literature, as was evidenced in his *Modern Literature of France* (1839). He was also engaged in the writing of more or less sensational novels, of which the first, *The Youthful Impostor*, had appeared in 1835, and in translating French novels, of which his rendering of Victor Hugo's *Last Day of a Con-*

demned Man (1840) was perhaps the best. About 1846 he became editor of *The London Journal*, which soon obtained a wide circulation for its sensational and dramatic tales and, later in the same year, started *Reynolds's Miscellany*, to which he was a frequent contributor of fiction and which ran for 23 years. He had been the foreign editor of the *Weekly Dispatch* since 1840, but, its tone having grown somewhat too mild for his palate, he withdrew from the paper in 1847 and threw himself, body and soul, into the Chartist agitation and the other advanced propaganda of the period. He presided at a proscribed meeting in Trafalgar Square, London, in 1848 and afterwards made the arrangements for the abortive Chartist demonstration on Kennington Common. With the decline of Chartism his interest in active politics waned and his later years were given over to journalism. In 1850 he founded *Reynolds's Weekly Newspaper*, which immediately became the organ of democratic and republican opinion. He died in London on June 17th, 1879. Besides his novels he also published *Mysteries of London* (1846; 1855), *Mysteries of the Court of London* (1850-56) and contributed some volumes of historical character to the series issued by John Dick, a firm in which he was said to be largely interested.

Reynolds, JOHN HAMILTON, poet, was born at Shrewsbury, Shropshire, on September 9th, 1796, and educated at St. Paul's School, London. He was placed in the Amicable Insurance Office, but gave early proof of a very decided poetical bent. In 1814 he published *Sajie, an Eastern Tale*, which Lord Byron thought well of, and *The Eden of Imagination*, which showed the influence of William Wordsworth. In 1816 he became the friend of John Keats and issued in the same year another volume of verse, *The Naiad*. After his friendship with Keats the quality of his work distinctly improved. Keats projected along with him a translation in verse of Boccaccio's tales to which he contributed *Isabella, or the Pot of Basil*, while Reynolds wrote *The Garden of Florence* and *The Lady of Provence*. In 1818 he entered a solicitor's office and thenceforward largely gave up to Law what was meant for Letters. In 1819 he produced a successful farce *One, Two, Three, Four, Five*, and next year a humorous volume called *The Fanny*. He toured on the Continent in 1820 and after Keats's death published the already mentioned *Garden of Florence and other Poems* (1821), in which, next to the sonnets, the finest thing was an uncompleted poem in the Spenserian stanza called *The Romance of Youth*, in which he partially disclosed his own disillusionment by contact with the world. Afterwards he wrote much for the *Edinburgh* and other Reviews, his connection with the *London Magazine* bringing him the friendship of Thomas Hood, who married his sister. Hood and he together composed *Odes and Addresses to Celebrated Persons* (1825), and the former dedicated "Lycus the Centaur" to Reynolds. The friendship did not last, however, though the cause of the parting is unknown. Reynolds had meanwhile acquired a proprietary interest in *The Athenæum*, which he sold in 1831.

though remaining on the staff of reviewers. His last considerable effort was the farce of the *Con-founded Foreigners* (1838). About this time he retired to the Isle of Wight, where he became clerk to the County Court. He died at Node Hill, Newport, on November 15th, 1852.

Reynolds, SIR JOSHUA (whose name, curiously enough, was erroneously registered as Joseph), the first President of the Royal Academy, was born at Plympton, Devonshire, on July 16th, 1723. His



SIR JOSHUA REYNOLDS. (By Himself.)
(In the National Gallery, London.)

father, Samuel Reynolds, was parson of Plympton and also master of the grammar school. His grandmother on his father's side was a Dutch woman, and to this strain it may not be too far-fetched to ascribe some of the qualities in Sir Joshua's works that recall the greatest of the Dutch masters. He was educated at the grammar school of his native place, with some notion of his being trained as an apothecary, but the lad's taste for drawing led his father to send him to London in 1740 to study under Thomas Hudson, then a prominent portrait-painter. He stayed with the latter two years, and then practised the profession on his own account in Plymouth first and afterwards in London. His first noteworthy work (painted in 1753) was a portrait of Admiral Keppel, who had given him a passage to the Mediterranean in 1749. He visited the principal Italian cities and saw all the great works of art, finally returning, after a short stay in Paris, in 1752, after an absence of three years. But he reached London from the Grand Tour permanently disfigured in the lip from a fall from his horse in Minorca, and permanently deaf,

the infirmity being caused by a chill contracted in the Vatican. After living for a short time in St. Martin's Lane, he settled in Great Newport Street and began to paint portraits, securing gradually most of the fashion and beauty and intellect of the day among his clients, and his prices rose from ten guineas to hundreds for a portrait. In 1760 he went to reside in Leicester Square, his house becoming the resort of all the most important men of the period, and in the same year held an exhibition of his works in the Strand. He numbered among his warmest friends Burke, Goldsmith, Garrick, and Johnson, and founded the well-known Literary Club with their aid in 1764. On the starting of the Royal Academy in 1768, he was made its president and was knighted. In 1773 he was made D.C.L. of Oxford and was elected mayor of Plympton, an honour of which he was excessively proud. In 1781 he made a tour in the Low Countries and suffered a paralytic stroke next year. He was well enough to visit the Netherlands again in 1783, and in 1784 was appointed painter-in-ordinary to George III. in succession to Allan Ramsay. His industry continued unimpaired and his social engagements, always grateful to him, still engrossed his leisure; but he was threatened with blindness in 1789 and had perforce to relax. A temporary rupture ensued with his brethren at the Academy, which led to his resignation of the chair, but, at the King's request, he resumed office; but failing health compelled him to retire for good in December of the same year, and he died in London on February 23rd, 1792. He never married, and on his death left a fortune of £100,000 to a niece. He was buried in St. Paul's Cathedral. Reynolds, though unquestionably one of the first of English painters, was often careless in his work, and some of his colour has faded; but his portraits are so valuable a possession that his name is probably more honoured than those of greater artists. It were idle to enumerate those masterly works, but of those conceived in a more imaginative vein "Mrs. Siddons as the Tragic Muse" is regarded as his *chef d'œuvre*. There are renderings of this superb portrait in Dulwich Gallery and the collection of the Duke of Westminster, both painted entirely by Reynolds. As a writer on art he also obtained a high reputation, his *Fifteen Discourses on Art* being a classic of English literature. The National Gallery in London possesses many fine portraits by him.

Reynolds, SAMUEL WILLIAM, engraver and painter, was born in the West Indies on July 4th, 1773. He was educated in England and studied at the Royal Academy Schools and learnt mezzotint engraving from John Raphael Smith. His first remarkable plate, "The Relief of Prince Adolphus and Marshal Freytag," after Mather Brown, was published in 1797 and was followed by a large number of masterly engravings. Among the painters whose works he translated with completest success were James Northcote, George Morland, Sir Joshua Reynolds (with whom he asserted relationship) and John Hoppner. Of the older masters he engraved Rembrandt's "The Jew Merchant" and Rubens's

"The Rainbow." Turner employed him on his *Liber Studiorum*, in itself almost a certificate of perfect efficiency. He was *persona grata* in the Royal Household, becoming drawing-master to George III.'s daughters and engraver to the King, though declining the honour of knighthood. In 1809 he paid his first of several visits to Paris, where he enjoyed marked favour, and exhibited repeatedly at the Salon. Among French painters whose works he reproduced in black and white were Géricault ("Le Radeau de la *Méduse*"), Léon Cogniet ("Scène du Massacre des Innocents"), and Horace Vernet ("Mazeppa"). Between 1820 and 1827 he published a series of no fewer than 357 engravings, small in size but of wonderful excellence, after the most accessible works of Sir Joshua Reynolds. He was, however, not an engraver only, but a painter of landscapes in oil and water colours which, curiously enough, being mostly sent to France and Germany, are hardly known in England. Their treatment is powerful and otherwise of pronounced merit. He was engaged upon a plate of John Constable's famous picture "The Lock" when he died in London on August 13th, 1835. Among his pupils were David Lucas, the sympathetic translator of Constable's work, John Lucas and Samuel Cousins.

Rhabdocœlida, an order of the group of worms known as the Turbellaria or Planarians, and including those members of this group which are small in size with generally a straight, unbranched intestine. The sub-class was originally founded on the latter character, but it is now found necessary to include one group with a lobed intestine in this division. It is divided into three sub-orders:—(1) the *Acœla*, including some primitive marine forms without any intestine; (2) the *Rhabdocœla*, including the typical members with a straight intestine; and (3) *Alloicœla*, with a lobed intestine. The second order is that of the *Dendrocœlida*. The *Rhabdocœla* have a flat body with cylindrical or rod-shaped digestive organs, without a vent. They are carnivorous and suck the juice of small worms, entomostraca and insect larvæ, which they envelop in a secretion. One family, the *Opisthomiæ*, has a proboscis, coloured eyes, and calcareous particles connected with hearing. The family *Convolutidæ* are long flat worms with chlorophyll in their tissues and one of the species is a very active dweller between tidal limits on the English coast, but, though it swims well, has no special senses.

Rhabdoliths, minute, somewhat umbrella-shaped, calcareous spicules which are very abundant in deep-sea deposits both of the present day and of the past, whether true fossil oozes or chalk. They are formed by organisms known as "Rhabdospheres," which are generally regarded as calcareous algae.

Rhabdophora, or ROD-BEARERS, a term applied to the class of Graptolites.

Rhabdopleura, one of the two genera of animals allied to the Moss Animals or Bryozoa, which form the group *Pterobranchia*. The members of the genus are marine and occur in somewhat

deep water off the coast of Norway and the Shetlands and North Ireland.

Rhadamanthus, in Grecian mythology, the son of Zeus and Europa. For fear of his brother, Minos, king of Crete, he fled to Boœtia, where he married Alemene. In life he showed such justice and impartiality that he was elected a judge in Hades, along with Minos and *Æacus*. Plato says that the shades of Asiatics came before him, while those of Europeans were adjudicated on by *Æacus*, but when the bench of Infernal judges was divided in opinion Minos had a casting vote—all of which sounds a little modern. In any case Rhadamanthus gave his name to an adjective occasionally in literary use to signify a solemn, inflexible and absolutely final judgment.

Rhætic Beds, the name given to the uppermost division of the Trias from its development in the Rhætic Alps, where it forms a massive group of marine limestones and dolomite, with bands of shale. In Germany they are represented by sandy clays, sandstones, and thin seams of coal, containing ferns, horse-tails (*Equisetites*), and cycads (*Pterophyllum* and *Zamites*), in addition to the typical marine pelecypods, *Avicula contorta*, *Cardium rhæticum*, *Pecten valoniensis*, and *Pul-lastra arenicola*, the crustacean *Estheria*, fish, such as *Ceratodus*, saurians, and the oldest European mammal, *Microlestes antiquus*. In England these beds form a narrow band from Lyme Regis in Dorsetshire to the Yorkshire coast and Carlisle, with an average thickness not exceeding 50 feet, though sometimes reaching 150 feet, and consisting of thin beds of black paper-shales with *Avicula contorta*, white limestone (White Lias), a bone-bed containing pyrites, fish-bones, coprolites, etc., and grey marls and clays. From their exposure near Cardiff, as well as on the Severn cliffs, they are also known as Penarth beds. Rhætia, from which both the Rhætic beds and the Rhætic Alps derive their name, was a Roman province that comprised the country between the basins of the Po and the Danube now embraced in Grisons and Austrian Tirol.

Rhæto-Romance. [ROMANSCIL.]

Rhampsinitus, one of the ancient Egyptian kings, whom Diodorus calls *Rhampsis*. He was the successor of Proteus and the predecessor of Cheops. A number of legends are extant about him. He is said to have possessed wonderful treasures, which he was obliged to keep in a repository of stone for safety. He descended into Hades and there played dice with Demeter, the goddess, and on his return inaugurated a festival in her honour. He belonged to the 20th dynasty and built the western propylæa of the temple of Hephestus, in front of which were placed two great statues called by the Egyptians Summer and Winter.

Rhatany, the root of *Krameria triandra*, an undershrub belonging to the order *Polygalacæ*, the Milkwort family, and native to Peru and Bolivia. The roots are astringent, and are used medicinally in diarrhoea, certain forms of hemorrhage and cases in which an astringent action is desired.

They are also ingredients in dentifrices and yield a red infusion which is used as an adulterant of port wine.

Rhayadr, the name of several waterfalls in Wales, the word itself being the Welsh for "cataract." They are found mostly in Merionethshire, Carnarvonshire and Radnorshire. In the first-named shire the principal are Rhayadr Cwm, 2½ miles east of Festiniog, where the Cynfael descends from precipitous heights forming a series of rapids; Rhayadr Du, 2 miles south-west of Maentwrog, where the volume of water is more notable than the height, and another Rhayadr Du, 5 miles north of Dolgelly, where there is a double fall of nearly 60 feet; and Rhayadr Mawddach, 6 miles north of Dolgelly, where the fall descends in three cascades, the uppermost of which is 20 feet in height and in width, the middle one 30 feet in height and the lowest also 30 feet high. In Carnarvonshire, at the Rhayadr Mawr, 6 miles east by south of Bangor, the Aber issues from a narrow channel 100 feet long, makes a sheer descent of 120 feet, interrupted by projecting rocks, but finally dropping 60 feet in a broad sheet of spray. Another Rhayadr Mawr, 4½ miles north-north-west of Llanrwst, is formed by a small tributary of the Conway, the cascade making several falls, the highest of which is 50 feet. At Rhayadr-y-Wennel, 2 miles north-by-west of Bettws-y-Coed, the Llugwy flows between lofty hills into a deep tree-lined chasm, whence it emerges by a series of cascades which are most impressive in flood. Rhayadr Gwy, on the Wye, in Radnorshire, 11 miles south of Llandidloes, was a full of considerable beauty and extent until many of the rocks that gave rise to it were destroyed for the construction of a stone bridge in 1780, although the river still runs violently and forms picturesque rapids. Of these the finest is Rhayadr Mawddach.

Rhea, a mythological divinity of the ancients, mother of Zeus, Poseidon, and other gods by Cronos, who is said to have swallowed them all except the first-named, who was saved from a like fate by his mother's wit. When Zeus was born Rhea handed Cronos a large stone covered up like an infant in swaddling clothes and the easy-going cannibal, nothing loth, swallowed the bundle, no question asked. This very stone was preserved at Delphi and was anointed daily with oil and on solemn occasions was wrapped up in white wool. But for this, one might hesitate to believe the legend. Crete was the earliest seat of the worship of Rhea, but there was hardly a country where a temple to her was not raised. She figured on many coins and was, as Dr. Schmitz expressed it, "the great goddess of the Eastern world." She was identified with Cybele and her priests were the Corybantes, who, with drums and cymbals, performed their frenzied dances in her honour on mountain and in wood. The lion amongst animals and the oak amongst trees were sacred to her, and the genius of Pheidias was called in to immortalise her in art. **RHEA SILVIA** was the mother by Mars of the twins Romulus and Remus, the former of whom was the legendary founder of Rome.

Rhea, or **NANDU**, a genus of South American ostrich-like birds with three species, each distinguished by its geographical range as well as by anatomical characters. *Rhea americana* occurs

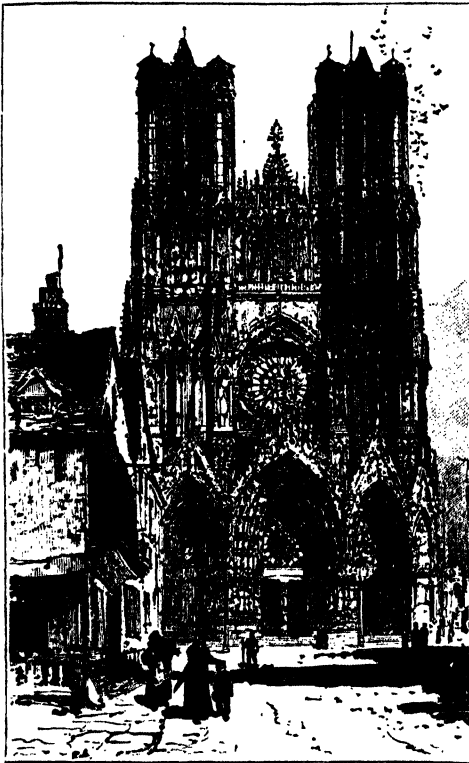


RHEA.

from Southern Brazil and Paraguay to Patagonia; *Rhea darwini*, named after the illustrious naturalist who discovered it while engaged on the voyage of the *Beagle*, is found in the south-east of the continent; *Rhea macrorhyncha* is met with in North-Eastern Brazil. It is singular that, just as the ostriches in Africa used to associate with zebras and antelopes, so the rheas on the pampas herd with deer. The wings are useless for flight, though more developed than in the ostrich. Each of three digits of the fore-limb bears a claw. There are three toes. The feathers have no aftershaft; and the general plumage is sombre, except in Darwin's Rhea, most of the feathers of which are tipped with white. Though the feathers have not the remarkable beauty of those of their African congeners, a certain amount of traffic is carried on in them and it is sad to think that this trade has already exterminated the birds in some areas where they were once common.

Rheims, or **REIMS**, a town in the department of Marne, France, on the right bank of the Vesle and the Aisne and Marne Canal, 81 miles E.N.E. of Paris. Vine-clad slopes surround the valley in which it lies. The town is strongly fortified by outlying forts, the streets are regular and wide, and there are fine squares. The chief buildings are the magnificent 13th-century cathedral of Notre Dame, 466 ft. long and 121 ft. high, with two large towers and a gorgeously beautiful western façade with three portals, a rose window and fine statues; the church of St. Rémi; the Archbishop's palace, which the kings, who were all (except Henri IV.) till the time of Napoleon crowned here, occupied at the time of coronation; the Porte de Mars, a Roman relic, since repaired and now in good preservation; the Hôtel de Ville, the Maison des Musiciens and other fine old houses. Rheims is a great centre of the champagne trade and has extensive cellars hewn out of the chalk, and there is a large production of merino, cashmere, flannel and blankets, as well as dye-works, breweries, tanneries and worsted-mills, besides manufactures of biscuits, chemicals, glass, paper, soap, candles and machinery. It is a town of great antiquity, and was in the Roman period the capital of Gallia Belgica. It was devastated by the barbarians in the 5th century, but after his victory at Soissons Clovis was baptised by St. Remigius in 496 in a church the site of which is now occupied by the cathedral. Councils were held in the town in 1119 and 1148 and, though it was ceded to the English in 1420, it

was restored to the French through the instrumentality of Joan of Arc, who caused Charles VII. to be crowned in the cathedral. The town joined the League (1585), but after the battle of Ivry yielded to Henri IV. It suffered much in the invasions of 1814 and in 1870-1, as the seat of a German



THE CATHEDRAL, RHEIMS.

governor, paid a pretty penny for the privilege thrust upon it. Pop. (1901), 108,385.

Rhenish Prussia, or RHINE PROVINCE, the most westerly province of Prussia, Germany, bounded on the N. by Holland, on the N.E. by Westphalia, on the E. by Hesse-Nassau, on the S.E. by the Grand Duchy of Hesse, on the S. by the Bavarian Palatinate and Lorraine, on the W. by Luxemburg and Belgium and on the N.W. by Holland. It occupies an area of 10,423 square miles and is traversed from north to south by the Rhine, the chief affluents of which within the territory are, on the right, the Lahn, Sieg, Ruhr and Lippe and, on the left, the Moselle and Ahr. In the north the country is low-lying, but mountainous in the south, which includes the Eifel range, parts of which are volcanic and whose highest point is about 2,500 feet above the sea. Most of the land is fertile and,

besides cereals, raises abundance of cattle, horses, sheep, goats and pigs. The minerals are plentiful and comprise iron, coal, copper, lead, zinc, manganese, clay, gypsum, marble, porphyry, and alabaster, and on this account the Province is the headquarters in Germany of the iron and steel industry. The manufactures are of equal importance and include textiles, machinery, chemicals, sugar, glass, porcelain, leather, paper, beer and wines, the vintage of the Moselle and certain of the Rhine wines being in high repute. Among the industrial centres may be mentioned Essen, Elberfeld, Barmen, Crefeld, Düsseldorf, Mülheim, Aachen, Cologne, Duisburg, Gladbach, Rheydt, Remscheid and Solingen. The administrative districts embrace Cologne, Düsseldorf, Aachen, Coblenz and Treves. The university of Bonn is situated in the Province, of which Coblenz is the capital. Pop. (1901), 5,759,798, or 552 to the square mile, the highest density in Germany.

Rheostat, an instrument whose electrical resistance can be readily varied, used for adjusting the strength of electric currents. The instrument which was originally invented by Sir Charles Wheatstone consisted of two cylinders, one of wood and one of brass, fitted in a frame so that they could be turned by handles. A wire was wound in an open spiral partly on one and partly on the other, and springs were provided which rubbed on the ends of the wire to enable it to be introduced into a circuit. The part of the wire wound on the brass cylinder was short-circuited and so cut out; but that on the wooden cylinder was interposed in the circuit. By winding the wire from the brass to the wooden cylinder the resistance could be increased, and *vice versa*. In rheostats of modern construction a number of coils of wire of any required resistance are fixed in a frame and their ends are connected to brass blocks. By means of a switch lever touching the blocks any of the coils can be introduced into the circuit. In another form a pile of carbon plates is provided with copper connections at the ends and arranged to be compressed by a screw; the resistance interposed at the points of contact of the plates diminishes as the pressure is increased. A trough of liquid (zinc sulphate, dilute acid, mercury, etc.), having movable connection plates, is also sometimes used as a rheostat.

Rhesus, THE, or BHUNDER (*Macacus rhesus*), the common monkey of Northern India. When fully grown it has powerful shoulders and limbs, the body being about two feet in length and the tail eight inches or so. The fur on the back is brown or rufous, on the limbs and under surface ashy-brown, while the seat-pads and face (in adult males) are red. There is no hair ruff around the neck, the ears are very visible, and there is a remarkable looseness or folding of the skin of the throat and belly. It is an intelligent creature, but extremely mischievous and an adroit thief, sometimes causing stall-keepers in the bazaars endless trouble and loss, since its sacred character among the Hindoos enables it to escape punishment.

Showmen, however, teach it many tricks in which it rapidly becomes expert.

Rhetoric, in a general sense, is co-extensive with oratory, embodies the principles of prose composition, and deals with appeals made to the Understanding, Will, or Taste. In a narrower sense, it denotes the Art of Persuasion, and as such addresses itself chiefly to the Will and Emotions. Among writers on rhetoric may be mentioned Aristotle, Cicero (who divided his speeches in a rhetorical manner), and Archbishop Whately. Edward William Cox (1809-1879), a well-known serjeant-at-law, founder of *The Field*, *The Law Times* and *The Queen*, endeavoured to apply in his book *The Advocate* (1852) the principles of rhetoric to bar-oratory.

Rheumatism. *Acute rheumatism* or *rheumatic fever* is a disease in which febrile disturbance is associated with swelling and intense pain affecting various joints of the body. As a rule, one joint after another is attacked, those first affected recovering the normal condition as others are involved; the larger joints, particularly the wrists and knees, are especially liable to suffer, but almost any joint may be attacked. The disease is often attributed to exposure to wet and cold; it seems to be to some extent hereditary, and generally manifests itself in young adults. It sometimes occurs in association with scarlet fever. In a considerable proportion of cases of rheumatic fever the heart becomes involved in the mischief. Pericarditis may occur, or the fibrous structures of the aortic or mitral valves may be implicated. In this way serious organic disease of the heart is not infrequently set up as the result of an attack of acute rheumatism. Pleurisy and other lung affections are not uncommonly met with in association with the disease. In some cases of acute rheumatism the condition known as hyperpyrexia supervenes, the temperature rising to 108° or even 110° Fahr., with cerebral complications. The treatment of acute rheumatism demands the most careful attention, having regard to the serious mischief which may result from neglect in this malady. Absolute rest in bed until complete convalescence is established is essential, the diet requires to be carefully regulated, and salicylate of soda is usually administered; the condition of the heart requires to be carefully watched. There is, unfortunately, a tendency for rheumatic fever to recur in subjects whom it has once attacked. Gonorrhœal rheumatism is a peculiarly intractable form of joint malady which occurs in some cases of gonorrhœa.

Chronic rheumatism is found mostly in elderly persons and the poor who are engaged in open-air employments. There is a wearing, heavy pain in the joints, which creak when moved and are always stiff and work with difficulty. The pain is worse at night, the warmth of the bed inviting it. The disease is most troublesome in cold, wet seasons and may last for years. Hot fomentations, followed by rubbing with turpentine and acetic acid, capsicum, or other stimulating liniment, usually afford some relief. The patient must dress warmly, avoid as much exposure as possible in inclement

weather and take plenty of nutritious food, of which fats should form a large proportion. Cod-liver oil and iron provide a judicious blend of fat and tonic, and five grains of iodide of potash, thrice a day, should be taken when the night pains are severe.

In *muscular rheumatism* pain is mainly felt in the muscles. There are usually slight fever, which may precede the pain, and perhaps sore throat. It manifests itself in a variety of forms. Stiff neck generally affects the young. Pleurodynia, or stitch in the side, consists of a sharp pain, much increased by moving, coughing, sneezing, or drawing a deep breath. But there is no sign of disease. Lumbago commonly attacks men at or after middle life. Pain is excruciating in bending or rising from a stooping or recumbent position. Fever and other symptoms, if any, are slight. Rest in bed is essential in all kinds of muscular rheumatism. Mustard poultices and hot fomentations are useful at first and, later, rubbing with belladonna liniment, while a belladonna plaster both soothes and supports. Dry heat applied by covering the loins with flannel and passing a hot flat-iron over it to and fro is serviceable in lumbago, and Turkish baths, with intelligent shampooing of the affected muscles, should certainly be resorted to. Lint soaked thoroughly in an infusion of capsicum and kept in position with oil-silk will cure stiff neck. Myalgia, the soreness and stiffness of the muscles that follow the first use of muscles that have not been employed for a period (as after the first day's cricket or skating), is not distinctly rheumatic. It may occur in any muscle and is sometimes accompanied by cramp. The pains diminish with rest and neither temperature nor pulse should be affected, though the latter may be rapid from weakness. Rest, the support of a firm bandage (stays for the body in women, tight-lacing being forbidden, and a broad stout belly-band for men), nutritious food, cod-liver oil and iron and quinine are the principal points in the treatment of myalgia.

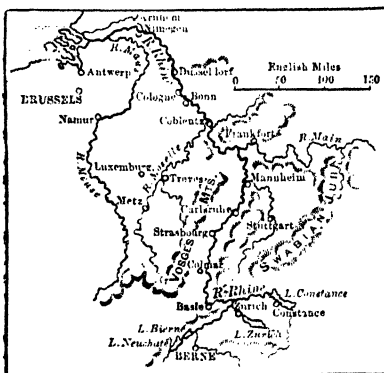
Rheumatoid arthritis, sometimes called *rheumatic gout*, affects women oftener than men. Pain and swelling, at first not severe and with little fever, grow worse and worse until they are almost continuous. The joints first involved are usually those of the hands, but the feet, knees, wrists, jaw and spine are all liable to attack. The joints become twisted, knobbed and stiff and some poor sufferers are bent nearly double. The disease if taken early may be mitigated, if not cured, but it is most intractable always and ordinarily incurable. The patient's strength must be maintained with generous, wholesome, non-kickshawsy diet, reinforced by cod-liver oil. Turkish baths (omitting, if necessary, the hottest room) are often helpful. The best drugs are iodide of potash, the syrup of iodide of iron, and arsenic, which must, however, be administered according to the doctor's prescription. The joints should be painted with iodine liniment, and it is advisable to employ friction, after hot-water sponging, with turpentine and acetic acid, or capsicum liniment, or camphorated oil, and the parts should be kept carefully covered with flannel or cotton wool.

Rheydt, a town of Rhenish Prussia, 25 miles N.W. of Cologne. It owes its importance to its industries, all of modern growth. The manufactures include textiles, machinery, ironware, paper and velvet, besides dyeing and brewing. Pop. (1900), 34,000.

Rhine, THE (German, RHEIN), one of the most important rivers of Europe, receives over 1,200 tributaries, rises in the Swiss canton of Grisons, and has three main sources, the Vorder-, Hinter-, and Mittel-Rhein. The Vorder comes from three sources, rising to the north-east of St. Gothard, the Mittel from Lake Skur in Dimthal, and the Hinter from the Rheinwald Glacier, flowing 70 miles through Rheinwaldthal. The height of the head waters above sea-level is over 7,500 feet. The Mittel-Rhein joins the Vorder-Rhein at Dissentis, and the Vorder-Rhein, flowing east, joins the Hinter-Rhein at Reichenau, from which point it becomes the Rhine Proper, being about 140 feet wide and capable of conveying floats, and becoming navigable at Chur, where it receives the Plessur. From this point it flows north, leaves Grisons, receives the Ill, and helps to form the Bodensee (Lake Constance) and Untersee; then flowing westwards it separates Switzerland from the Grand Duchy of Baden, and flows on to Schaffhausen (where the famous Falls occur, the stream making a majestic leap of 100 feet and reaching a level of 1,180 feet above the sea) and Basel, receiving in its course the Goldach, Thur, Thöss, Glatt, and Aar on the left, and some tributaries from the Schwarzwald on the right. At Basel it turns north and separates Alsace from Baden, Baden from Rhenish Bavaria; then through

North and South Rhine, the south branch, called the Waal, joining the Maas, while the north, called the Rijn, flows to Arnhem, dividing into right and left branches, the right forming the old and new Yssel, and flowing into the Zuyder Zee, while the left, still called the Rijn, dwindles and flows into a canal. The river is 750 feet wide at Basel, increasing to 2,150 feet at its entry into Holland, while the depth varies from 5 feet to 50 feet. Its total length from Reichenau to the North Sea, including windings, is 700 miles, of which 400 miles pass through German territory. From the Bodensee to Schaffhausen the river is navigable by steamers, thence to Basel the course is rocky and in the lower part the river is studded with islands, some of which are cultivated and others covered with timber. Among its fish are salmon, trout, sturgeon, pike, carp, lampreys, and the islands abound in wild-fowl. The navigation of the Rhine is important; loaded vessels ascend to Spire. There are several rapids, and in parts the river flows through narrow gorges. From Basel to Mainz wide side-valleys open towards the Vosges on the left and the Black Forest on the right, while at Bingen mountain ridges descend to the left bank. The towns, villages, tower-crowned heights, vineyards, and side-valleys make the Rhine the most picturesque of European streams and a favourite resort of tourists. In the literature of topography the Rhine occupies the foremost place. To the Teutonic imagination it has always made constant and vivid appeal, haunting German folklore, song and story and inspiring the painters and musicians of the Fatherland.

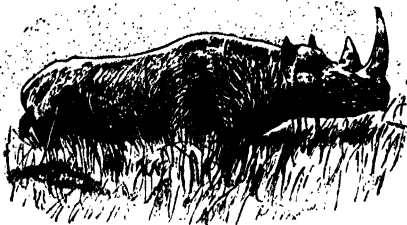
Rhinoceros, an animal belonging to the genus *Rhinoceros*, constituting a family of perissodactyle hoofed mammals. They are huge creatures, of small intelligence, timid in disposition, but formidable foes when irritated or wounded, for they deal terrible blows with their nasal horns. They form three groups, sometimes raised to generic rank: (1) With a single horn, and the skin arranged in definite folds or shields. Here belong the Indian Rhinoceros (*R. unicornis*) and the Javan Rhinoceros (*R. sondaicus*). The Indian form, like all its Asiatic congeners, possesses incisor teeth, which are absent from the African forms. There seems to be some relationship between this dentition and the development of horns, individuals with the smallest horns having the largest incisors. The Indian Rhinoceros occurs in East India, chiefly beyond the Ganges, and is met with also in Bengal, Siam and Cochin China. It frequents shady forests, marshy places and the vicinity of rivers. Its average height is a little over four feet. The Javan species, found also in Burma and near Calcutta, is much smaller, and its shields are differently arranged from those of the Indian form. In the females the horn is small, or it may be wanting. (2) With two horns, and the skin shields less strongly marked than in the first group. The Sumatran Rhinoceros (*R. sumatrensis*), the smallest living form, is the only member of this group, the Hairy-eared Rhinoceros (*R. lasiotis*) from Chittagong being probably only a variety, though the point is not definitely settled. The latter is characterised



SKETCH MAP OF THE RHINE.

the Grand Duchy of Hesse, which it separates from Nassau; then divides Nassau from Rhenish Prussia; then enters Rhenish Prussia, receiving many rivers, among them being the Neckar, Wiese, Main, Lahn, and Moselle, and passing the towns of Strassburg, Mannheim, Worms, Mainz, Bingen, Bonn, Cologne, Dusseldorf. Below Emmerich it enters Gelderland (Holland), and divides into the

by the long hairy fringe to its ears, and the covering of long fine reddish hair on its body, while the skin is smoother and more finely granulated and the tail shorter than in its Sumatran ally. (3) Two well-developed horns and the absence of definite shields characterise the third group, which contains the Black Rhinoceros (*R. bicornis*), ranging from Abyssinia to the Cape, and the nearly extinct "White" Rhinoceros (*R. sinensis*), from the country



RHINOCEROS.

south of the Zambesi and probably Central Africa. Both are greyish-black in colour, the latter often the darker. The chief difference is that the former has a prehensile upper lip, and feeds on the branches of trees, and the latter has the upper lip square and grazes. Skins and skeletons of *R. sinensis* were brought to England in 1894. The "White" Rhinoceros measures over twelve feet long and stands nearly six feet high. The anterior horn averages about thirty inches in length, the posterior seldom exceeding fifteen inches. The Black Rhinoceros is the smaller. It was once thought the hide of a Rhinoceros was impervious to bullets, but Gordon Cumming, Sir Samuel Baker, Livingstone and other travellers dispelled this notion. The Rhinoceros was represented in the later Tertiary by several forms which roamed over nearly the whole of Europe and North Asia. Of these extinct species the most interesting was the Woolly Rhinoceros (*R. tichorhinus*), the entire body of which was covered with hair and wool and which was associated with the Mammoth.

Rhino-plastic Operation, an operation designed to improve the appearance of the nose in cases where extensive loss of substance has occurred in consequence of disease. The result is obtained by the transplantation of a piece of skin, usually from neighbouring parts of the face, though it may also be taken from another part of the body. Joseph Constantine Carpué (1764-1846) used a flap of heart-shaped skin from the forehead in the operation which goes by his name and of which he published an account in 1816. It is also known as the Indian method, having been long in vogue in the East. In the operation that is called after Johann Friedrich Dieffenbach (1794-1847), a lance-shaped flap of skin, also from the forehead, was used. These operations almost entirely superseded the Italian or Talmacioti method, so named after Gasparo Tagliacozzi (1546-99), Professor of Surgery and Anatomy in Bologna, who first introduced it

into surgical practice. It cannot be supposed that the result of the operation is generally satisfactory. No surgeon's skill avails to replace the bony frame of the nose and the problem for the patient usually resolves itself into a question between two disfigurements, with the imminent risk of securing both.

Rhizocarps, or HYDROPTERIDEE ("water-ferns"), a small but interesting group of Pteridophyta comprising two orders, the Salviniaceæ and the Marsileaceæ, each with two genera, *Salvinia* and *Azolla*, and *Marsilea* and *Pilularia*, with a very small number of species. The Salviniaceæ are floating plants; the Marsileaceæ live in wet ground, *Pilularia* globulifera being the only British species. In *Salvinia* submerged leaves take the place of roots. The stem in all cases is a slender rhizome. *Salvinia* has broad, flat floating leaves with remarkable air-cavities; those of *Azolla* are minute and two-lobed; *Marsilea* has a long erect circinate petiole, with four cuneate leaflets at its apex; and in *Pilularia* the blade of the leaf is suppressed. All Rhizocarps are heterosporous and leptosporangiate. The Salviniaceæ bear male and female sori on the same plant, developed from the tip of a leaf-lobe, and surrounded by an indusium, the male containing numerous microsporangia, the female from one to twenty-five megasporangia. The Marsileaceæ have more complex sporocarps, each representing the blade of a leaf-segment and enclosing numerous sori, each of which contains both microsporangia and megasporangia. It is the globular sporocarp to which *Pilularia* owes its name of "pill-wort." *Azolla* contains filaments of an alga (*Anabaena*), living symbiotically in pits in its leaves. *Marsilea* includes the nardoo of Central Australia, upon the starchy spores of which the Burke and Wills expedition starved in 1861.

Rhizocephala (Greek, "root-headed"), a group of degraded parasitic Crustacea which live on the abdomen of crabs and hermit crabs. They were once regarded as a distinct order, but are now known to be members of the Cirripedia which have suffered degeneration owing to their parasitic habits. The young are free and the adult female is destitute of all appendages, attaching itself by means of root-like prolongations from the head to the body of the host upon or within which it is found. The only manifestations of life which these Crustaceans present are powerful contractions of the roots and alternate expansion and contraction of the body, causing water to flow into the brood-cavity to be again expelled through a wide orifice. In 1858 Lilljeborg discovered a very interesting instance of super-parasitism. He found what he took to be a female *Peltogaster* with an egg-sac, but careful dissection demonstrated that a *Cryptothyria*, a parasite of a higher order, had become parasitic upon the parasite. Apparently the intruding parasite procures the death of the original parasite by intercepting the nourishment conveyed by the roots.

Rhizome, an underground shoot, generally horizontal, often fleshy and with more or less

numerous and elongated internodes. It derives its scientific name and its popular designation of root-stock from its root-like appearance, and when the older part dies, it forms what is termed a premorse root, as in the primrose and the scabious. The elongation of the rhizome may be unlimited (indefinite) or limited (definite). In the former case it continues to elongate at its apex, and bears either only foliage-leaves, as in bracken; or foliage-leaves and scales in regular alternation, with annual shoots arising from their axils, as in the wood-sorrel; or only scales, with annual shoots in their axils, as in Herb Paris. The definite branching is more common, when the apex grows out into an aerial annual shoot, and one or two branches are given off from the axils of scales at its base. If the older part persist, a sympodium is formed which may be either bilateral, as in ginger, or unilateral, as in Solomon's-seal. If the older part perish, as in the common buttercup (*Ranunculus acris*), each annual shoot forms a new individual by "innovation." The term rhizome is applied also to the rare case of vertical growth of such a sympodium, as in the water-hemlock (*Cicuta*). The wiry rhizomes of the sand sedge (*Carex arenaria*) bind together wind-blown sand-dunes. Those of many plants store up large quantities of starch, as in the arrowroots, and they may resemble a chain of corms, or when abbreviated, as in Arum, a single corm.

Rhizopoda is one of the subdivisions of the phylum Protozoa, and includes all those in which the animal is provided with the thick, irregular and non-vibratile processes from the body known as pseudopodia. These serve either for locomotion or for the procuring of food. In the typical cases the pseudopodia vary in shape and position, being withdrawn from one place and protruded in another; sometimes, however, they are stable, but are always retractile. In the first stage in the life-history, a whip-like process or flagellum may be present, but this never occurs in the adult. There are seven classes:—

- (1) Heliozoa, or Sun-animalculæ.
- (2) Radiolaria, or Polycistina.
- (3) Foraminifera.
- (4) Amœbina, including the Proteus-animalcule.
- (5) Mycetozoa, or Fission-fungi, which are possibly vegetable.
- (6) Labyrinthulida.
- (7) Proteomyxa, including a group of primitive and little-known forms.

Rhode Island, one of the New England States and one of the foundation members of the American Union, bounded on the N. and E. by Massachusetts, on the S. by the Atlantic and on the W. by Connecticut. It occupies an area of 1,250 square miles, of which 197 square miles are water, and is the smallest State in the Union. Its seaboard is heavily indented by Narragansett Bay and numerous islands belong to it, including Rhode Island (or Aquidneck), which lies in the bay just mentioned and from which the State takes its name. The north-western region is

elevated, the highest points being Durfee Hill (805 feet) and Jerimoth Hill (795). Towards the coast pine plains and cedar swamps occur. The island of Aquidneck (15 miles long by $\frac{3}{4}$ broad) is extremely fertile and has been called (not by Charles Dickens) the Eden of America. The rivers include the Blackstone (Pawtucket, or Seekonk), Pawtuxet, Pawcatuck and Wood, all of which afford water power to industrial establishments. The so-called Providence River is really an arm of Narragansett Bay. The minerals are not of much importance and comprise anthracite coal, iron and copper ores, and amorphous graphite, while granite is quarried. The climate is mild and pleasant and the predominance of manufacturing towns renders dairying and market-gardening extremely profitable. The leading crops are maize, oats, barley, hay and potatoes, but the land is grazed rather than tilled. In respect of its industrial wealth and enterprise the State ranks with the highest in the Union. The chief manufactures consist of cottons, worsteds, woollens, jewellery, silver-ware, machine-shop products, silk, rubber and elastic goods, besides iron-founding and dyeing. Brown University in Providence is one of the oldest colleges in the Union. The principal towns are Providence (175,597) the capital, Pawtucket (39,231), Woonsocket (28,204), and Newport (22,034), the most fashionable watering-place in the country. Rhode Island was colonised by Roger Williams at Providence in 1636, by William Coddington at Portsmouth in 1638, and by Samuel Gorton at Warwick in 1642. The charter granted by Charles II. remained in force till 1842, when, as a result of the Dorr revolt against government under an antiquated system, the present modern constitution was established. The early settlers being mainly refugees from the spiritual tyranny and temper prevalent in Massachusetts, complete religious toleration was secured from the first. Though it threw off British rule in 1776, Rhode Island was the last of the original colony-states to sign the federal constitution, which it ratified in 1790. Pop. (1900), 428,556.

Rhodes, an island in the Ægean Sea, belonging to Turkey. It is situated to the south-west of Asia Minor, from which it is separated by a channel 10 miles broad. It has a length of 50 miles, a breadth of 16 miles and occupies an area of about 550 square miles. Mount Artemis in the centre is 4,068 feet high, and from it the land, which is fertile, slopes in a series of plains to the sea. The climate is pleasant and many rivulets water the soil. Wine figs and oranges are exported, and corn, cotton and olives are grown. Rhodes was a place of much interest in ancient times, especially for its maritime renown and its excellent maritime laws, which were compiled by the Rhodians after they had established their supremacy at sea. Colonised first by a people from Western Asia, and then by Dorians, it sided sometimes with Athens, sometimes with Sparta, in the Peloponnesian Wars, being afterwards subdued by Alexander the Great and forming a province under the Romans. In 651 it became Mohammedan, and from 1309-1522 it was in the hands of the Knights of St. John, since which

period it has been Turkish. Pop. of island, about 35,000. RHODES, the capital, which is at the north-east end of the island, has many mosques, a convent, and the palace of the Grand Master of



THE LAOCOÖN.

the Hospitallers. The noted harbour is now half silted up, and is divided into two by a ruined mole, upon which is a lighthouse. The famous Colossus was a brazen statue of Helios, the Sun-god, which was 120 feet high. It stood at the entrance of one of the ports, but the tradition that it bestrode the harbour and that the largest vessels could sail between its legs is probably legendary. It was the work of Chares of Lindus (the modern village of Lindo), who took twelve years to execute it, and it was regarded as one of the Seven Wonders of the World. It was erected in 280 B.C., and was overthrown in 221 B.C., or thereabouts, by one of the earthquakes to which the island is subject. After lying for 800 years, it was broken up and the metal sold by the Saracens. In ancient times the Rhodian school of sculpture took very high rank. Its choicest work was the celebrated group of the Laocoön, now in the Vatican. Rhodes has undergone many sieges, the last being one of seven months by the Turks in 1522. Pop., about 11,000.

Rhodes, CECIL JOHN, financier and statesman, was born at Bishop Stortford, Hertfordshire, England, on July 5th, 1853, and was educated at the grammar school of his native place. He was intended for the Church, but threatened lung trouble led him to go to the Cape. In 1870 and 1871 he and his brother were among the successful diamond diggers on the Kimberley fields and the foundation was laid of a vast fortune. His health being restored, he returned home and matriculated at Oriel College, Oxford, but his life being again menaced he resorted to another stay in South Africa. When he was thoroughly set up, he kept terms at Oxford from 1876 to 1878 and took his degree a few years later. In 1881 he became a member of the Cape Assembly, and was largely instrumental in promoting the British protectorate in 1884 over Bechuanaland, of which he was Resident

deputy-Commissioner. He also engineered the negotiations with King Lobengula, which eventuated in the formation of the British South Africa Company, which received its charter in 1889, with practically sovereign powers over Matabeleland. During his tenure of the Cape premiership, the Jameson Raid took place on January 1st, 1896. Though he did not participate in the actual inroad he was privy to it and resigned his position. His political career in Cape Colony being closed, he turned his attention to the development of the vast South African territory named after him Rhodesia. He was amongst the besieged in Kimberley during the Boer War. The hardships then undergone ruined his never robust constitution, and he died at Cape Town on March 26th, 1902, being buried on the Matoppos Hills, where he interviewed the Matabele chiefs at imminent personal danger in 1896, and went through what he described as "one of the scenes which make life worth living." He was a keen advocate of the scheme for the Cape to Cairo railway, and was interested in promoting Home Rule for Ireland, in evidence of which he gave £10,000 to the Parnellite party fund. By his will he left a large sum of money to provide a number of scholarships of the value of £300 a year, tenable by students from British Colonies, the American States, and Germany, at any college in Oxford

University for three consecutive academic years. They were founded for the purpose of impressing Colonial students with the benefit of maintaining the tie between the Mother Country and the Colonies, and of asserting the unity of the British Empire; of encouraging American students to remain loyally attached to their country; and of promoting a healthy and friendly understanding between the United Kingdom and Germany. Already the Rhodes scholars have made their influence felt in Oxford.



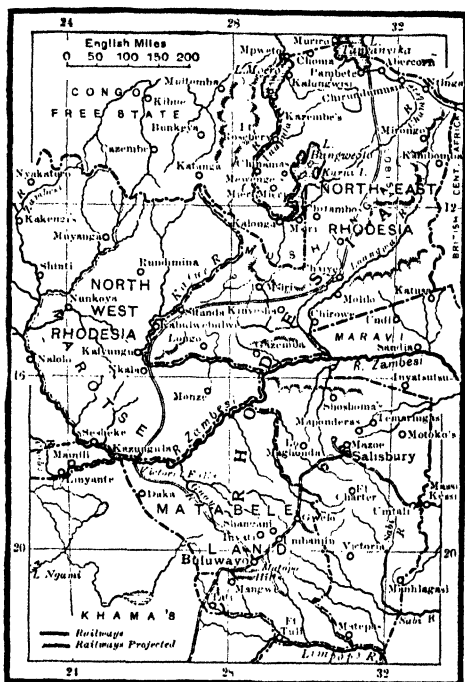
CECIL J. RHODES.

(Photo: J. Gribble.)

Rhodesia, a region of southern Africa, under British rule, bounded on the S. by the Transvaal, on the E. by Portuguese East Africa, the British Central Africa Protectorate south and west of Lake Nyasa, on the N.E. by German East Africa, on the N. by the Congo Free State, and on the W. by Portuguese West Africa and German South-West Africa. The southern boundary is sometimes described as the parallel of 22° S. The river Zambesi divides it into two portions, Southern and Northern Rhodesia. SOUTHERN RHODESIA, consisting of the provinces of Matabeleland and Mashonaland, has an area of about 144,000 square miles. The

population of Matabeleland in 1905 comprised 208,000 natives and (in 1904) 7,706 Europeans and 1,352 Colonial natives and Asiatics. The population of Mashonaland in 1905 numbered 391,590 and (in 1904) 4,917 Europeans and 592 Colonial natives and Asiatics. The gold resources of the country are enormous, other minerals being silver, copper, antimony, arsenic, lead and coal. The principal towns are Salisbury (the capital), Victoria, Umtali, Bulawayo and Gwelo. **NORTHERN RHODESIA**, consisting of North-Eastern Rhodesia and Barotseland, or North-Western Rhodesia, has an area of 288,000 square miles, of which 182,000 belong to Barotseland. The population of North-Eastern Rhodesia in 1903 amounted to 346,000 natives and 241 Europeans. The administrative headquarters

Charter was granted on October 29th, 1889. There is a Resident Commissioner (who is also Commandant-General), while Southern Rhodesia, North-Eastern Rhodesia and North-Western Rhodesia have each an Administrator, each assisted by an Executive Council of four members appointed by the Company, subject to the approval of the Secretary of State, and a Legislative Council, consisting of the Administrator, seven nominees of the Company approved by the Secretary of State and seven members elected by registered voters. The region was named after Cecil J. Rhodes, the statesman, who was the first to bring its development within the domain of practical politics. Victoria Falls on the Zambesi have become one of the great "show-places" of the continent.



SKETCH MAP OF RHODESIA

are at Fort Jameson on the Tanganyika plateau, and the most important centres are Fife and Abercorn, both on the Stevenson Road. Gold and coal are the principal minerals. Much of the country is suitable for cattle; wheat, European fruits, fibre plants, coffee and cotton are likely to do well. The population of Barotseland is estimated at 400,000 natives. The headquarters of the Administration are at Kalomo. The soil is adapted not only for pasture but also for the cultivation of rice, oats and rubber. Both divisions of Rhodesia are within the sphere of operations of the British South Africa Company, to which a Royal

Rhodium (symbol, RH; atomic weight, 104), a rare metal discovered at the beginning of the 19th century by William Hyde Wollaston (1766-1828). The metal occurs in only a few rare minerals usually associated with platinum and its allied metals. It has a specific gravity of 12.1, and is a silver-white metal resembling aluminium in appearance. It is insoluble in acids, but as an alloy may be dissolved by aqua regia. The solutions of its salts form rose-red liquids, from which fact the name of the element was derived.

Rhododendron, a widely diffused genus of shrubs and trees belonging to the heath tribe, with broad evergreen leathery leaves, and showy clusters of funnel-shaped or sub-campanulate, five-lobed, slightly mono-symmetric flowers, with ten stamens, generally declinate and dehiscing by pores. The genus is not separable from *Azalea*. Most of the species are Indian, where some grow as epiphytes, as does also *R. Brookeanum*, of Sarawak. *R. nivale* grows at an altitude of 17,000 feet in the Himalaya; *R. lapponicum* on the shores of Davis Strait; *R. ponticum*, the honey of which is said to be poisonous, the commonest species in British gardens, is hardy and grows from self-sown seed in England; and *R. catawbiense* and others are natives of North America. Numerous hybrids have been raised in nursery gardens, and the flowers vary immensely in size and colour. Kew Gardens and Hyde Park when the rhododendrons are in bloom are among the finest features of the early summer in London.

Rhombzoa, one of the two subdivisions of *Mesozoa*, a group of interest, as it is supposed to contain organisms which are intermediate between the multicellular animals or *Metazoa* and the unicellular forms or *Protozoa*.

Rhondda, a river in Glamorganshire, Wales. It is formed by the confluence of the Fechan and Fawr, which rise within two miles of each other, about five miles west of Aberdare, and run almost parallel in a south-easterly direction for nearly ten miles. After the waters meet they pursue their joint course to Newbridge, where the Rhondda falls into the Taff. The vale of Ystrad-y-fodwg, down which the Fawr flows, possesses remarkable charm, but the beauty of Rhondda Valley has been sadly marred by the chimney-stalks and other parapher-

nalia of coal-mines and metal-works. The district of Rhondda Valley is now thickly peopled (in 1901 the pop. was 113,735).

Rhône, THE, rises in the Swiss canton of Valais, a few miles from the source of the Rhine, having its origin in the Rhône Glacier (5,581 feet above the sea). At first it flows rapidly from fall to fall, west through Valais, and enters the Lake of Geneva at its eastern extremity, flowing out in a deep-blue stream at Geneva in the south-west. Receiving the Arve, it flows south-west to the French frontier, then south between Ain and Savoy, north-west to Lyons (where it receives the Saône), south to Avignon, south through the Bouches-du-Rhône department and into the Gulf of Lyons. At Arles it divides into two branches, the Petit Rhône, to the south-west, the delta of which is known as the Île de Camargue, and the Grand Rhône to the south, which falls by two mouths into the Gulf. The chief towns passed are Geneva, Lyons and the Provençal towns—celebrated by Daudet—Avignon, Tarascon, Beaucaire, Arles. O. its course of 580 miles, 200 are in Switzerland, and 360 are navigable. Its basin is 38,000 square miles in area. The chief tributaries on the right bank are the Ain, Saône and Ardèche, and on the left the Arve, Isère, Drôme and Durance. Canals connect the Rhône with the Rhine, Seine, Loire, and Garonne. The annual discharge of sediment is enormous, being estimated at 22,000,000 cubic yards. The deposits at the mouth of the river encroach rapidly on the sea and it has been calculated that, within 200 years, the land has extended $\frac{1}{2}$ miles towards the sea.

Rhône, a department of South-Eastern France, bounded on the N. by Saône-et-Loire, on the E. by Ain and Isère, and on the S. and W. by Loire. It comprises most of the ancient provinces of Lyonnais and Beaujolais and covers an area of 1,077 square miles. The surface is hilly, the Cevennes Mountains occupying a large proportion of the country, heights of more than 3,000 feet being numerous. The Saône skirts its eastern boundary and this (with its tributaries, the Azergues and Gier) is the principal river. The chief crops are wheat, oats, rye, potatoes and vines, and the mineral wealth comprises copper, iron and coal. There are large forests of chestnut-trees and plantations of mulberries for the rearing of silkworms. Live-stock are raised, but not on a remarkable scale. The manufactures include muslins, cottons, linens, silks, (those of Lyons enjoying a world-wide celebrity), velvets and ribbons. The department produces excellent wine, and the milk cheese of Mont d'Or is in high repute. The capital is Lyons (453,145). Pop. (1901), 835,157.

Rhopalocera. [BUTTERFLY.]

Rhubarb, the general name now applied to the genus *Rheum*, perennial herbaceous plants belonging to the order Polygonaceæ and mostly natives of Central Asia. They have thick rhizomes, large sheathing petioles to their broad radical leaves, and much-branched panicles of small white,

green, or pink trimerous flowers. The name is variously derived from the Greek *rhoeo*, "I flow," or more probably from *Rha*, an ancient name for the Volga, on whose banks *R. Rhaiponticum* still grows. The ancient Greeks recognised two sorts, the Asiatic or *Rha ponticum*, and the Scythian or *Rha barbarum*. *R. palmatum*, first found wild by Colonel Prejevalsky, in the extreme north-west of China, in 1872-3, is the true source of the drug known as Turkey Rhubarb, because formerly imported *via* Anatolia. It is now brought to Europe *via* Kiakhta and through Russia. The rhizome, when dry, is covered with a yellow powder, appears mottled red and yellow when broken, has a bitter astringent taste, and is gritty from crystals of acid oxalate of calcium. *R. Rhaiponticum*, a native of Russia, cultivated in England since 1573, is now grown on an enormous scale, especially near London, for the sake of its pleasantly acidulous leaf-stalks, which are used in tarts, jam, etc., or in the manufacture of "champagne." This species and *R. officinale*, from South-East Tibet, are grown at Bodicott, near Banbury, for medicinal purposes. There are several preparations of rhubarb root in the British Pharmacopœia, the drug being extensively employed as an astringent and bitter stomachic, and in larger doses as a purgative. The compound rhubarb pill in five-grain doses is often given as an aperient, and the compound rhubarb powder (Gregory's powder) is frequently administered to children. Rhubarb, in whatever form, is one of the "sheet-anchor" medicines for all minor ailments of the household.

Rhuddlan, or RHYDDLAN, a town of Flintshire, Wales, 3 miles N. by W. of St. Asaph, beautifully situated on the Clwyd, here navigable to the sea. The town is said to derive its name from the red earth near the river. Of the castle built or reconstructed by Robert, nephew of Hugh Lupus, Earl of Chester, who obtained possession of the place in 1098, only the shell remains, a massive quadrangular structure with circular towers at two angles and two gateways, each flanked by turrets. After being partly destroyed by the Welsh, it was repaired in 1157 by Henry II. Several times the Welsh seized it afterwards, but it was finally captured in 1277 by Edward I., who made it his headquarters whilst engaged in the congenial work of subjugating the Principality, and issued hence the Statutes of Rhuddlan (1284), by which the English judicial system was introduced into Wales. Edward rebuilt the castle, which was the birthplace of the Princess Elizabeth (hence styled The Welshwoman). The castle was dismantled shortly after its capture from the Cavaliers by General Mytton in 1646. There are remains of the Blackfriars' Monastery founded in 1197 by Ranulph de Blundeville, Earl of Chester, and of a hospital of the Knights Templars. Tuthill, or Toothill, a mound, encircled by a ditch, is believed to be the site of the fortress erected by Llewelyn ap Iŷtŷllt in 1015 and demolished in 1063 by Harold, son of Earl Godwine. Rhuddlan marsh, between the town and the sea, witnessed the defeat of the Welsh by the King of Mercia in 795. The town was incorporated by Royal Charter

in 1284. The principal industry is the making of agricultural implements. Pop. (1901), 1,800.

Rhyl, a watering-place, Flintshire, Wales, situated at the mouth of the Clwyd, on its right bank, $4\frac{1}{2}$ miles N. by W. of St. Asaph. A hundred years ago it was only a fishing village, but its pure bracing air, dry climate and fine stretch of sands have brought it into great vogue as a seaside holiday resort. The public buildings include the Town Hall, Market Hall, Queen Alexandra Hospital, and several hydropathic institutions. The Esplanade, nearly a mile long, is divided into an east and west parade, and from it there projects a pier which commands grand views of the Carnarvonshire hills. There are Winter Gardens, near which a marine lake of considerable extent has been formed, and a Pavilion with a large central hall. In dry weather with a stiff Nor' Wester the surface sand sometimes rises in clouds that are more noticeable than pleasant. Pop. (1901), 8,473.

Rhyme (properly "rime," the usual spelling being the result of confusion with the word "rhythm"), the art of composing poetry so far as its measure, etc., are concerned. Rhyming is sometimes taken in the narrower sense of similarity of sound in the endings of verses, and is in this sense an invention of post-classical times. The most common rhyme is the one-syllabled or male rhyme, e.g., "gave," "save," a rhyme which is largely employed in English and German, where monosyllables abound, and the double or female rhyme, e.g., "bitter," "glitter," which is more common in Italian and Spanish poetry. The French employ both. The triple rhyme also is found in all these languages. European rhyming is thought to have taken its origin in the Latin hymnology of the Church, while the Teutonic and Norse poetry was distinguished by its alliterations. Leonine rhyme is that which rhymes at the middle as well as at the end of verses. Lord Byron, Algernon Charles Swinburne, and Robert Browning may be cited as great masters of the art of rhyming.

Rhyncholites, the fossil beaks of the Cephalopoda belonging to the division known as the Tetrabranchiate. They are fairly common in those zones of the Chalk which contain many Ammonites.

Rhynchonella, one of the best known of the still-surviving genera of the Brachiopoda or Lampshells. It is the type of the Rhynchonellidæ, and dates from the Palæozoic period onwards. It is especially characteristic of the Oolitic and Cretaceous rocks.

Rhynchota, an order of insects also known as the Hemiptera. This alternative name is somewhat unfortunate, since it applies to only one division of the order and its original use was very much wider; on the other hand, the name Rhynchota or "Beaked" insects expresses the distinguishing feature of the order. The order is characterised by the presence of four naked membranous wings, by the facts that the mouth appendages are so modified as to enable the insect to feed by suction (the suctorial organ being com-

monly called the rostrum), and the caterpillar and adult stages are not sharply separated by a fixed chrysalis stage; the animal in the intermediate stage is active. The order is a very large one, numbering about 20,000 described species; the oldest known form is *Eugereon*, from the Permian deposits. The Rhynchota are divided into two groups: (1) the Heteroptera or Bugs, in which the front pair of wings are horny and the hind wings soft and membranous; (2) the Homoptera, in which all four wings are membranous. There are numerous families in both sub-orders. Among the Heteroptera the best-known forms are the Shield-bugs (or Scutelleridæ); the Chinch-bug or *Blissus* (one of the *Lygaeidæ*), which devastates the cornfields of America; the Bed-bugs or *Cimicidæ*, of which the best-known English species is *Cimex lectularius*, which first became abundant in England after the Fire of London, when it was introduced in timber; the large Wheel-bugs (*Reduvius*); the Water Scorpions or *Nepidæ*, of which *Nepa cinerea* (Linn.) is the largest English species, and the Water-boatmen or *Notonectidæ*. The Homoptera include the more interesting members of the order. The first family is that of the Cicadidæ, of which there is only one English species (*Cicada Anglica*, Curt.); the Cicadas abound in the Tropics, where their chirping enlivens the woods day and night. The Fulgoridæ include the Lantern flies and Candle



LANTERN FLY.

flies, some species of which are said to be luminous, though the records are not free from doubt. The frothy masses found on grass and known as "Cuckoo-spit" enclose the yellowish larva of *Aphrophora spumaria* (Linn.), which is the best-known member of a third family, the Cercopidæ; this also includes the Froghoppers. The Plant-lice or Aphides form another family. The Scale-insects or Coccidæ also belong to this sub-order. The females of this family produce several important products, such as cochineal (yielded by *Coccus cacti*, Linn.) and shellac (by *Coccus lacca*, Kerr). Both Heteroptera and Homoptera occur in the Jurassic, and are there represented by Cicadas, Water-boatmen, etc. The Plant-lice are known first in the Wealden (Lower Cretaceous).

Rhythm strictly means measured time, and is equally applicable to dancing, music, poetry, and prose. Rhythm is the heart of dancing as it is of music. In classic prose rhythm was governed by more or less rigid rules; in modern prose it is to a great extent a question of taste. In classic poetry rhythm was almost the one test of formal

excellence; in modern poetry it is to some extent modified by other principles. [METRE.] The rhythm of nature is a term that is occasionally used in the literature of Art. In this sense, as Arthur Symonds expresses it in his suggestive book *Studies in Seven Arts*, it "is a balance, a means of preserving equilibrium in moving bodies. The human body possesses so much volume, it has to maintain its equilibrium; if you displace its contents here, they shift there: the balance is regained by an instinctive movement of self-preservation. Thus what we call harmony is really utility, and, as always, beauty is seen to be a necessary thing, the exquisite growth of a need. And this rhythm runs through all nature, producing every grace and justifying every apparent defect."

Rhytina (*Rhytina stelleri*), the northern sea cow. This animal, closely allied to the dugong and manatee of the order Sirenia, was from 20 ft. to 25 ft. long and was of a brownish colour, sometimes marked with white. It was discovered by Steller in 1711 in the shallow bays round Bering Island off the coast of Kamchatka; and in less than thirty years the species was exterminated by the Russian traders, who killed these creatures for food. Nordenskiöld believed that some few survived till 1854, but this is not generally accepted. According to Dr. James Murie's account of the creature, it had a small oblong head, full bristly snout, and rugged, gnarled, warty, hairless skin. The fore limbs were short and stumpy, hairy at their extremities, and they had no finger-bones beyond the wrist. The black tail ended in a horizontal, stiff, half-moon-shaped, narrow fin-blade, fringed with a fibrous whalebone-like material. It had no teeth, but horny almost bony plates served the purpose of mastication. They were stupid, voiceless animals, but very affectionate, readily tamed and even allowed themselves to be handled. They fed on seaweed and, when they rose to the surface to breathe, made a snorting noise. They appeared in families, which sometimes combined to form great herds. They were usually hunted with a boat-hook attached to a long rope which, when one was struck, was passed to the sailors on land, who then hauled the victim ashore.

Ribbon Fish (*Regalecus banksii*), or OAR-FISH, a division of deep-sea spiny-finned fishes found in the Mediterranean, off the coast of Norway and in British waters. Specimens of from 15 ft. to 20 ft. long have the body about a foot deep, with a maximum thickness of three and a half inches. Their colour is silvery, with irregular dark lines and spots on the fore part of the body. The dorsal fin is red, but there is no trace of a caudal fin. The anterior twelve spines form an elevated crest behind the head. The snout is truncated and there are no teeth in the mouth. The stomach is prolonged as a pouch and extends between the muscles to near the tail.

Ribbonism, the name taken by or bestowed upon certain secret societies in Ireland founded in the early part of the 19th century with a view to counteract the influence of the Orange associations.

Though recruited from Roman Catholics their objects seem to have been wholly political and latterly they occasionally countenanced wanton outrages, such as the maiming of cattle and incendiarism. The name is supposed to have been derived from the green ribbon or badge worn by members, although there must, in that event in Ireland, have been some chance of their numbers appearing to be much larger than in effect they were. The society was divided into lodges and had passwords and signs. The members were almost exclusively of the lower classes, and differed in their objects in different times and provinces. Apparently Ribbonism ceased before 1875.

Ribbon Worms, a popular name for the worms belonging to the Nemertea, which were so designated in consequence of the extraordinary length (many feet in some instances) and flatness of several members.

Ribera, JOSEPE DE, painter, was born at Jativa, Valencia, Spain, on January 12th, 1588. His father wished him to pursue letters and he was sent to the University of Valencia, but the lad would be a painter, and accordingly entered the studio of Francisco Ribalta (1550?-1628). By his master's advice he proceeded to Rome, where painting and poverty, for him, went hand in hand, and where he won his nickname of Lo Spagnoletto, or the Little Spaniard. A cardinal, pitying him, made him his page, but splendour soon palled and the boy put on his rags and returned to the streets. He was, meanwhile, making steady progress in his art, studying Caravaggio, Raphael and Annibale Caracci, and going to Parma to learn what he could from Correggio. By 1615 he was again in Rome, which, however, he soon left for Naples, where Fortune began to smile on him. He married the daughter of a dealer who, as we should say, "boomed" his great picture of "El Martirio de San Bartolomé," which procured him the patronage of the Count de Monterey, Duke of Osuna, the Spanish Viceroy, for whom he painted several canvases. He was now the recognised head of the Italian Naturalists. The subjects he preferred were gloomy and horrible, like the sufferings of the saints, as in the case of the "Martyrdom" just named. He could appreciate the beautiful and paint tenderly, but a deliberate choice of agony and torture seems to show there was a strain of cruelty in his disposition, which came out in the disgraceful cabal he entered into with Belisario Correnzio and Giambattista to prevent every artist of merit from practising his calling in Naples. There is reason to believe that the tyrants were directly responsible for the deaths of Annibale Caracci and Domenichino, while Guido and other painters fled from the reign of terror thus established in Neapolitan art circles. When Ribera purposely destroyed with a corrosive fluid a fine study of a dead Christ by his rival Massimo Stanzioni (which he had fraudulently induced the monk-owners to send him in order that he might wash it) he perpetrated one of the most dastardly actions chronicled in the whole history of Art. Mrs. Walter Gallichan (Miss C. G. Hartley), in her

admirable *Record of Spanish Painting*, seeks to extenuate his criminal conduct and arrogance by referring them to the spirit of the age and country. The plea is idle and, having regard to the character of the subjects Ribera himself elected to paint, it is certain his moral nature must have become grossly perverted. Nevertheless, he was a virile painter, a fine draughtsman, a vigorous modeller, and a master of light and shade. In 1630 he was elected a member of the Academy of St. Luke in Rome and in 1644 received from the Pope the Order of Abito de Cristo. The year of his death, which is presumed to have taken place at Naples, is unknown, but he was overwhelmed with grief when his beautiful daughter Maria Rose eloped with Don Juan of Austria about 1648, and he must have died between this date and 1656, probably about 1650. Of his many paintings scarcely any first-rate examples are in England. Spanish galleries, however, are extremely rich in them. At Salamanca there is the "Immaculata," in the Escorial "Jacob watering the flocks of Laban," at Cordova the "Rest on the Flight into Egypt," at Toledo the "Holy Family with St. John," in the Prado at Madrid, "Ixion," "Prometheus," "Jacob's Ladder," the "St. Bartholomew" above mentioned and many more of his most characteristic works. Salvator Rosa, Aniceto Falcone and Luca Giordano were among his pupils.

Ribes, a genus of shrubs forming a well-marked tribe of the order Saxifragaceæ, comprising some seventy species, mostly American, but including the European *R. Grossularia*, the gooseberry, *R. rubrum* and *R. nigrum*, the red and the black currant. Some species in Alaska extend almost to the Arctic circle. They have scattered lobate leaves; racemes of flowers with a five-lobed coloured calyx, five petals and five perigynous stamens; and many-seeded berries. *R. sanguineum*, the red-flowered currant, a native of western North America, is a favourite in flower-gardens. Though it is not absolutely certain that the gooseberry and red and black currants are native to Great Britain, the fact that the cultivated varieties reach a higher degree of perfection in the United Kingdom than in any other European country is a strong presumption that they are indigenous.

Ribs. The ribs, twelve in number on each side of the human body, enter largely into the constitution of the bony framework of the thorax. They articulate behind with the dorsal vertebrae, the head or posterior extremity presenting two facets for articulation with the bodies of two contiguous vertebrae, while each rib also articulates with the transverse process of the lower of the two vertebrae with which the head is connected. Anteriorly the first seven ribs on each side are joined by their cartilages to the sternum (true ribs). The cartilages of the ribs below these are not inserted directly into the sternum (false ribs), and the eleventh and twelfth ribs are quite free anteriorly, whence their name of floating ribs. The spaces between the ribs are termed the intercostal spaces, and across these pass the two sets of muscular

fibres called the external and internal intercostal muscles. The inferior border of each rib presents internally a groove, the subcostal groove, in which the intercostal vessels and nerve lie. Fracture of the ribs is not an uncommon result of violence, and this accident assumes a serious character if the underlying pleura and lung are involved in the injury. Mammals other than man have sometimes more or fewer than twelve pairs of thoracic ribs. In birds and reptiles the number is extremely variable, there being more than 200 pairs in certain serpents. In the turtles they are fixed and consolidated with plate-like dermal bones to form the carapace or shield. In some fishes the ribs appear to be doubled in number, owing to their forking.

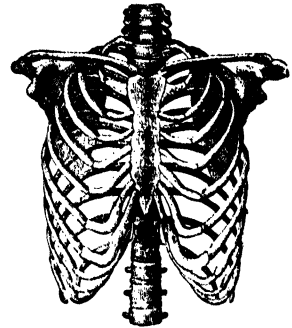


DIAGRAM OF THE RIBS.

Ricardo, DAVID, economist, was born in London of Jewish parents on April 19th, 1772, and was educated in England and Holland. His father was on the Stock Exchange, and the son, on leaving school, became his confidential assistant. His abjuration of the Jewish faith, however, and his marriage against his father's wish, led to their separation, and the younger Ricardo started as a member of the Exchange on his own account, and speedily acquired a great fortune. He began to study economics, and in 1810 wrote his first work, dealing with the depreciation of the currency. This went through several editions, and in 1817 he issued his most important work, *On the Principles of Political Economy and Taxation*, which must still be consulted by students of the dismal science. In 1819 he entered Parliament as member for Portarlington. He died at Gatcombe Park, his place in Gloucestershire, on September 11th, 1823. His works were collected and published by McCulloch, in 1846. His name has become, rather unjustly, a sort of symbol of the "abstract-deductive" method in economics.

Rice (*Oryza sativa*), a cereal grass which supplies food for a greater number of human beings than any other plant. It is a native of India, tropical Australia, and possibly China, but is now cultivated in all parts of the world where the necessary conditions of warmth, moisture and labour prevail. It is one of the most prolific of crops, growing best in alluvium liable to inundation, and requiring a temperature of 60° to 80° F. to ripen. The inflorescence is a panicle: there are six stamens to the flower, and generally an awn. The grain is poorer in fat, potash, or gluten than wheat, only containing 7 per cent. of the latter, as against 12 per cent. in maize, 14 in oats, and 22 in wheat. It is, therefore,

a purely farinaceous food, and should be supplemented by milk or other more nitrogenous diet. It is said to furnish food to one-third of the human race. Unknown to the Jews or Egyptians, and known to the ancient Greeks only as a curiosity, the plant was introduced into Spain by the Arabs as "aruz," and was first grown in Italy as "rizo," in 1468, though it is mentioned by Horace. It was not introduced into Carolina (which yields the finest rice both for size and quality) until 1700. Rice is used in distilling and largely for starch, as well as for food. Its starch-grains are the smallest known. Saki, the national drink of Japan, is brewed from it, and the spirituous liquor called arrack is sometimes distilled from it. In India rice in the husk is called paddy.

Rice, JAMES, novelist, was born at Northampton, England, on September 26th, 1843, and studied at Queens' College, Cambridge. While studying for the bar (to which he was called in 1871) he became editor of *Once a Week*, a position he filled for four years. In 1872 he was appointed London correspondent of the *Toronto Globe*, and seven years later published a gossiping *History of the Turf*. But his sole claim to fame rests upon the happy collaboration between him and Sir Walter Besant, in the production of a series of brilliant novels. Besant had contributed to *Once a Week* during Rice's four-years' editorship and the latter, finding himself unequal to write first-rate novels single-handed, invited Besant's co-operation. *Ready Money Mortibury*, the first fruits of the joint authorship, achieved a distinct success, and was followed by *My Little Girl*, *With Harp and Crown* and *This Son of Vulcan*. But it was *The Golden Butterfly* (1876) which set the seal of unqualified merit upon the co-partnership. Their other novels were *The Monks of Thelma*, *By Celia's Arbour*, *The Chaplain of the Fleet* and *The Scamy Side* (1881), the last in which Rice had a share. He died at Redhill, Surrey, on April 26th, 1882.

Rice-Bird. [BOBOLINK; JAVA SPARROW.]

Rice-Paper, a paper manufactured in China from the pith of *Fatsia papyrifera*, a plant belonging to the ivy family (Araliaceæ), native to swampy forests in Formosa and cultivated in China. It attains a height of about 20 feet and its leaves measure 12 inches across. From the pith the paper (which, of course, it is a misnomer to describe as "rice") is prepared. The pith taken from the stem is about an inch and a half in diameter and is cut spirally into lengths of three inches or thereabouts. These are pared by a very sharp blade into thin rolls, which, flattened and dried under pressure, form sheets a few inches square. The Chinese draw and paint upon the paper, which can, if necessary, be dyed and is also used in the making of artificial flowers.

Richard I., surnamed CŒUR DE LION, King of England, third son of Henry II. and Eleanor of Poitou, was born at Oxford on September 8th, 1157, and succeeded his father in 1189, being crowned at Westminster on September 3rd. In the following year he started on the Third Crusade which he had

been meditating for some time. He joined his forces with those of Philip Augustus of France, and the combined numbers amounted to 100,000. The two kings quarrelled in Sicily, and the reconciliation effected was ostensible not real, but before Richard left Sicily, which he claimed in virtue of being his father's heir and the leadership of the Crusade, he disposed of his claims to Tancred, the illegitimate cousin of William II. the late King of Sicily, for 40,000 ounces of gold, thus sanctioning Tancred's right to the throne. Journeying by different routes, Richard entered Cyprus, which he captured and handed over to Guy de Lusignan, and there married the Princess Berengaria of Navarre on May 12th, 1191. Shortly after reaching the Holy Land in the same year Acre was taken by the joint forces, and Philip by and by returned to France, leaving 10,000 of his men with Richard, who performed prodigies of valour, and totally defeated Saladin at Jaffa (August, 1192). On his way home to England Richard was shipwrecked and was for a long time imprisoned in the castle of Durrenstein—scene of the Blondel legend—by Henry VI., who demanded and received an enormous ransom from England. Richard landed at Sandwich, Kent, in 1194, and was re-crowned at Winchester (April 17th) to cancel the homage he had rendered to the German Emperor for England, as a condition precedent of his freedom. Then he began to make ready for war with France, in consequence of a breach of an agreement by Philip. Richard left England in May, 1194, and never saw it again. He was engaged in warfare and political embroilments in different parts of France for nearly five years, and was killed by an arrow while besieging the castle of Chalus, 17 miles south-west of Limoges, on April 6th, 1199, and was buried at Fontevault. Richard bequeathed his heart to Rouen, where it still is. He was of a sanguinary disposition, but of remarkable valour. Of his ten years' reign he did not spend more than six months in England.

Richard II., King of England, son of Edward the Black Prince and Joan, the Fair Maid of Kent, was born in the Abbey of St. Andrew, Bordeaux, France, on January 6th, 1367, and became Prince of Wales after his father's death in 1376, succeeding his grandfather, Edward III., in 1377. He was crowned at Westminster on July 16th. During the early years of his reign various rebellions, in some of which Wat Tyler and John Ball figured, and conspiracies arose. In 1382 he married the estimable Princess Anne of Bohemia, and in 1386 a commission of magnates was appointed, at the instigation of the Duke of Gloucester and the Bishop of Ely (Thomas Arundel), to reform the household and kingdom and to exercise some control over Richard, as yet a youth, hot-headed and imprudent. The king resented this step as an encroachment on his prerogative, but was unable to counteract the aggressive policy of the Duke of Gloucester and the Earls of Arundel and Warwick, who even contemplated his deposition. In 1389, however, having attained his majority, Richard suddenly announced his inten-

tion to be king in fact as well as in name, and checkmated the schemes of the recalcitrant nobles. In 1394 his queen died, and two years later he espoused Isabella of France, then only seven years of age, and concluded the war with France which had been raging. Both marriage and truce were unpopular, and Gloucester, Warwick and Arundel, who were suspected of fomenting rebellion, were put to death (1397). Richard's revenge seemed complete. In reality his *coup d'état* sealed his fate. Henry of Lancaster, John of Gaunt's son, with the aid of other nobles, forced him to resign the crown, and according to some accounts he was murdered in Pontefract Castle in 1399. Others state that he fled to Scotland and lived there till about 1417, but this story has not obtained general credence.

Richard III., King of England, son of the Duke of York and brother of Edward IV., was born in Fotheringhay Castle, Northamptonshire, on October 2nd, 1452. In his ninth year he was made Duke of Gloucester and Lord High Admiral. He was present at the battle of Tewkesbury (1471), and went to the French war in 1475, and headed the Scottish expedition of 1482. The king had befriended him to a remarkable degree, but the lengths to which his inordinate ambition carried him were early made evident by a series of revolting crimes of which there is too much reason to believe he was directly or indirectly the author. For he was suspected of the murder of Prince Edward and of Henry VI. (1471), and certainly instigated the death of his brother, the Duke of Clarence, in 1478. When Edward IV. died (1483) Richard treacherously caused his nephews to be sent to the Tower, where he afterwards had them murdered, declaring that they were illegitimate. In 1483 he was proclaimed king, but was soon conspired against by the Duke of Buckingham, Henry, Earl of Richmond, and others. His rule soon grew heartily detested and rebellion, headed by Harry of Richmond, triumphed on August 22nd, 1485, in the battle of Bosworth, in Leicestershire, in which Richard fell. He was the last of the Plantagenets.

Richard de Bury, Bishop of Durham and Chancellor of England, son of Sir Richard Aunger, was born in 1281 at Bury St. Edmunds, in Suffolk, and is commonly named after his birthplace. He studied at Oxford, where he distinguished himself as a scholar, and afterwards became tutor to Edward of Windsor who, when he ascended the throne as Edward III., loaded his preceptor with honours, which culminated in his appointment to the see of Durham in 1333. In the following year he was made High Chancellor of England and in 1336 Treasurer. The king employed him in several delicate diplomatic missions which he discharged successfully, and he was a capable administrator of the affairs of his bishopric. He lives in history, however, as the patron of learning and the first bibliophile. He amassed the finest collection of books till then brought together and founded a library in connection with Durham College, Oxford, to which he left his books and of which his *Philobiblon*, commemorating his love of books and in praise of learning, was written as a

handbook, explaining by what means he collected his books and how his library was to be managed. He died at Auckland in 1345.

Richard of Cirencester, an early English chronicler, who was a monk of St. Peter's, Westminster, in 1355. By leave of the abbot he made a pilgrimage to Jerusalem in 1391, was again an inmate of the abbey in 1397, fell sick in 1400 and died in that or the following year. He compiled the *Speculum Historiale de Gestis Regum Angliæ*, extending from 447 to 1066. The work contains several Westminster charters and early legends, but is of little value besides. It was upon Richard of Cirencester that Charles Julius Bertram (1723-65) fathered his impudent forgery of the *De Situ Britannie*, professing to be a treatise on the geography of Roman Britain, which he palmed off upon Dr. William Stukeley, the antiquary, and which was accepted as genuine until B. B. Woodward, the librarian of Windsor Castle, demonstrated it (1866-7) to be an imposture. Unhappily, in the long interval during which its authenticity was undoubted, enormous mischief was done to the literature of the Roman Occupation, most of the works published during that period being seriously affected, even Ordnance maps being vitiated in respect of the naming and situation of Roman stations.

Richardson, Sir Benjamin Ward, sanitary reformer, only son of Benjamin Richardson, was born at Somerby, Leicestershire, on October 31st, 1828, and by his mother's dying wish he became a physician. He was apprenticed to Henry Hudson, a surgeon at Somerby, and in 1847 entered Anderson's College, Glasgow, taking his diploma in 1850 and being admitted M.A. and M.D. of St. Andrews in 1854. In 1853 he moved to London and was admitted a member of the Royal College of Physicians and elected F.R.S. He gained the Fothergillian gold medal for his essay on the *Diseases of the Fetus in Utero* and the Astley Cooper triennial prize of 300 guineas for an essay on *The Coagulation of the Blood*. His address at Brighton, 1875, on *Hygeia*, in which he explained his views on sanitary science, attracted considerable attention, while his Cantor lectures at the Society of Arts in the same year on *Alcohol* showed him as the determined enemy of the abuse of a drug which, he taught, should only be resorted to in emergency. By his efforts to relieve pain he brought into use no fewer than fourteen anaesthetics and among other inventions he introduced a lethal chamber for the painless extinction of the life of animals. A prolific writer, he was one of the first champions of bicycling, and in recognition of his services was presented with a public testimonial in 1868 and knighted in 1893. He died on November 21st, 1896.

Richardson, Henry Hobson, architect, was born at St. James's, Louisiana, United States, on September 29th, 1838. On the father's side he was of Scottish extraction and his mother was a granddaughter of Dr. Priestley of Birmingham. Educated at Harvard and intended for the army,

Richardson took to architecture to follow his own bent, and studied at Paris, and in the South of France and other parts of Europe. On his return he began practice in New York and soon made his mark, being constantly loaded with commissions until his death at Brookline, Massachusetts, on April 27th, 1886. His first distinguished building was Brattle Street Church in Boston, but Trinity Church in the same city is by many considered his masterpiece, a position which he himself assigned to the Court House in Pittsburg. Other fine buildings designed by him were Sever Hall and Austin Hall at Harvard, the City Hall, Albany, the Library at North Easton, and the Field Building in Chicago, and numerous beautiful residences in New York and elsewhere.

Richardson, SIR JOHN, naturalist, son of Gabriel Richardson, was born on November 5th, 1787, at Nith Place, Dumfries, where Robert Burns, who was his father's friend, spent his Sunday evenings from 1790 to 1796. When four years old he could read well, and the poet lent him *The Faerie Queen*. "I wonder which of them will be the greatest man," Burns said when his eldest boy entered Dumfries School the same day as young Richardson, aged eight. He studied at Edinburgh University and, becoming a naval surgeon, saw active service. In 1819 he was appointed surgeon and naturalist to Sir John Franklin's Polar expedition and Franklin acknowledged his indebtedness to him for his advice. In 1825-7 he accompanied Franklin on his second expedition, and on his return devoted his spare time to the preparation of his most valuable work, the *Fauna Borca'i-Americana*, dealing with the natural history of the animals of North America. Richardson was appointed physician to the Royal Hospital, Haslar, in 1838, and among his pupils was Thomas Henry Huxley, who stated that he owed to him his start in life and "what he had to show in the way of scientific work or repute." He was knighted in 1846 and chosen to conduct the Franklin Search Expedition of 1848. He died on June 5th, 1865, at Lancrigg, Grasmere, the property of his third wife, where the last years of his life were spent in gardening and giving medical aid to the poor.

Richardson, SAMUEL, novelist, was born in 1689 in Derbyshire. He was the son of a joiner, but of good descent, and was destined for the Church. His father, however, had not the means to carry out his intention, and Samuel was apprenticed to a printer in London, in his 17th year, having received but a slight education. His conduct during his apprenticeship was exemplary, and he was able to devote some time to study. He married his master's daughter, and soon afterwards started a printing business of his own, first in Fleet Street and afterwards in Salisbury Court, close to St. Bride's Church, which he often attended. Through the influence of Speaker Onslow he obtained the printing of the Journals of Parliament. He gave such attention to his business, and was so industrious and enterprising in developing it, that he made it a great success, and this prevented him from appearing as an author until he was over fifty

years of age. He was then induced to write by two booksellers requesting him to furnish them with a volume of familiar letters as models for unlettered country folk to copy. He then decided to write *Pamela* in epistolary form, the story having been suggested to him by one he had not long before listened to. The first part appeared in 1740, and

had been composed in two months. Two other volumes followed, and the whole work received the warmest praise from his contemporaries, Alexander Pope declaring it would do more good than twenty sermons. *Clarissa Harlowe*, which is generally conceded to be Richardson's masterpiece, was published in 1748. Five years later his



SAMUEL RICHARDSON.

Sir Charles Grandison appeared, and was not so successful, its moral tone being somewhat over-emphasised. With the exception of an essay or two, it was his last work. Richardson was undoubtedly a great novelist and a great English writer, but his books are more talked about than read, being, in general, too tedious. They are illuminated by flashes of true sentiment and contain many fine scenes. His only personal fault was his vanity, and Dr. Johnson, an avowed admirer, tells us he did little else than talk about his works. He was elected Master of the Stationers' Company in 1754 and died in London on July 4th, 1761. His house at North End, Fulham, was occupied a century later by Sir Edward Burne-Jones, the painter. His correspondence was published in 1804 in six volumes, with a life by Mrs. Barbauld.

Richelieu, ARMAND JEAN DUPLESSIS, CARDINAL, DUC DE, statesman, was of noble family and was born at Richelieu, in the department of Indre-et-Loire, France, on September 5th, 1585. He studied at the Colleges of Navarre and Lisiens, and would have entered the army but that his elder brother, Bishop of Luçon, resigned his see, and it was decided that the younger brother should obtain it. Henri IV. consented to the arrangement, and Richelieu began to study with that object, taking his doctor's degree at the age of 20. In 1607, with some hesitation, the Pope consecrated him, and soon afterwards he was elected to the States-General by the Poitou clergy as their deputy. Favoured by Marie de Medicis, in 1616 he was

appointed Secretary of State, and soon gained great ascendancy over the young Louis XIII. and his mother. When Marie de Medicis incurred the displeasure of the Court, he was banished, but he cleverly effected a reconciliation, and was before long recognised as the most powerful man in France. In 1622 he was created a cardinal, and in 1624 took his seat on the Supreme Council. Till his death, eighteen years later, he practically governed France. One of his most cherished plans was to curtail the power of the nobles and render the crown more independent and powerful, and in this he succeeded. The encroachments of the nobility were stopped, and they became dependent on the king, instead of the reverse, a condition which had obtained for some time before. Richelieu, being quite unscrupulous, considered any means justifiable, and sent many a noble head to the scaffold and the dungeon. He next subdued the Calvinists, and in person laid siege to their stronghold, La Rochelle, which he captured in 1628. He, however, had only a political purpose in view, and allowed them freedom to follow their religion without molestation. His greatest service to France, perhaps, was the humbling of the house of Austria, which then had enormous influence in Europe. To gain his ends he roused the Protestants against the Austrian emperor, and in several countries and by all manner of devious methods worked at the sapping of Austria's power. He finally reduced it to the subordinate position it had held before the death of Charles V. The closing years of his life saw the rise of Cinq-Mars' conspiracy, but Richelieu triumphed, and the conspirators were executed in 1642, not many months before



CARDINAL RICHELIEU.

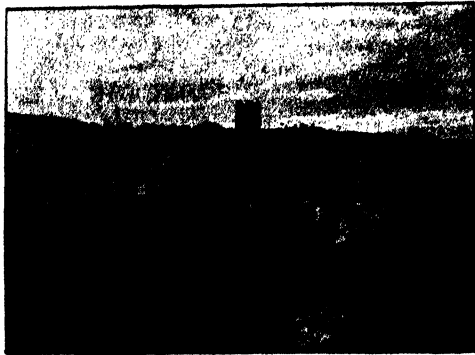
(From the portrait in the gallery of Versailles.)

the death of their heavy-handed master who died on December 4th of the same year. Richelieu founded the French Academy. It was largely due to him that Germany, Spain, and Savoy were kept in check so long. He was buried in the Sorbonne.

Richepin, JEAN, French poet, novelist and dramatist, was born at Meden, in Algeria, in 1849. Before taking to literature he had gone through the Franco-German war, and had also been actor, sailor and labourer. His early books proclaimed the advent of a man with a new note, but at first his utterance was uncouth and in fact he lost his liberty for a while because of his temerity and sins against taste. When the untutored stage, however, had passed, riper judgment, greater restraint, chastened thought and marked originality procured for Richepin a wide audience. In each branch of literary effort he has cultivated he has done much remarkable work. Among his novels may be named *Jules Vallis* (1872), *Madame André*, *Les Morts Bizarres* (1877), *La Glu* (1881), *Le Pavi* (1883), *Miarka la Fille à l'ourse* (1884), *Braves Gens* (1886), *Césarine* (1888), *Le cadet, Trouan-duilles* (1890), *L'Aimé* (1893), *Flamboches* (1895), *Lagibasse* (1900) and *Contes Espagnols* (1901). His verse includes *La Chanson des Gueux* (1876), which got him into trouble with the authorities for its plainness of speech, *Les Carresses* (1877), *Les Blasphèmes* (1884), *La Mer* (1886), *Mes Paradis* (1894) and *La Bombarde* (1899). Of numerous plays there may be mentioned *Nana Sahib* (1883), *Le Chien de Garde* (1889), the five following at the Comédie Française—*Monsieur Scapin* (1886), *Le Filibustier* (1888), *Par le Glaive* (1892), *Vers la Joie* (1894), *La Martyre* (1898)—*Le Chemineau* (1897), *Les Truands* (1899), *La Reine de Tyr* (1900), *Le Cavalier* (1901) and the opera of *Le Mage* (1897) in conjunction with Massenet.

Richmond, a town in the North Riding of Yorkshire, 42 miles N.W. of York, on the left bank of the Swale, which is crossed by a stone bridge a little below the town. The town is situated on a height above the river in the midst of beautiful scenery and on this account and because of its healthy climate is a favourite resort. St. Mary's Church, an ancient structure, presents Norman features, but having been enlarged at different times shows the work of several periods. Holy Trinity was built in the 12th century and repaired in 1360, but afterwards was allowed to fall into ruin and became secularised. In 1744, however, the nave was repaired and used for worship and, in 1864, the north aisle, which had been used as a Consistory Court, was added to the church. The tower stands apart from the church, and contains a bell which has rung curfew from time immemorial and is still tolled for that purpose every night at 8 o'clock. The other buildings include the town-hall, savings bank (in which the Richmond Scientific Society and Mechanics' Institute are accommodated), masonic hall, workmen's hall, market house and the grammar-school, established and endowed by the citizens and incorporated by Queen Elizabeth. The castle, a noble ruin on lofty ground commanding the river, has a keep 100 feet high and, owing to its remarkable situation and fine surroundings, has formed a popular subject with J. M. W. Turner and many other painters. A mile to the south-east of the town are the interesting remains of Easby Abbey, a Premonstratensian house

founded in 1152. Among the industries are iron- and brass-working, rope- and paper-making and tanning, and there are training stables in the neighbourhood. Pop. (1901), 3,836.



RICHMOND, YORKSHIRE.

(Photo: Sanderson Bros., Richmond.)

Richmond, a town of Surrey, England, on the right bank of the Thames, 10 miles S.W. of London. Its surroundings are unique in beauty. Situated on a hill that rises gently from the finely-wooded banks of the river, it is crowned with one of the grandest parks in the country. The view from the Terrace on the brow of the hill is scarcely surpassed by the famous prospect from Windsor's Round

earlier. The town was originally named **SHEEN**, and was the site of a royal palace which, though destroyed by Richard II. in an ecstasy of grief at the loss of his young queen, was rebuilt by Henry V., who also founded here (1414) a Carthusian convent, called the House of Jesus of Bethlehem, and a house of Celestines. Henry VII. established near the palace an Observantine convent, suppressed in 1534. He held a grand tournament at the palace in 1492 and when, six years later, the mansion was nearly burned down, he had it rebuilt and ordained that it should be called Richmond in future, in honour of his former earldom. Queen Elizabeth died in the palace in 1603 and, in 1637, Charles I. added to it the superb New or Richmond Park of 2,253 acres, the encircling wall of which measures eleven miles. The palace gradually perished and all that remains is the entrance gateway in Old Palace Yard, over which may yet be deciphered the Tudor arms. In the Old Deer Park, north of the town, by the river side, is the Observatory built in 1769 by Sir William Chambers and, in close proximity, are the celebrated gardens of Kew. The church of St. Mary Magdalen, partly ancient, is an edifice of brick, flint and stone. At the west end of the north aisle lies James Thomson, the poet. The church contains memorials to Edmund Kean and Mrs. Yates, both ornaments of the stage, while in the churchyard was buried Viscount Fitzwilliam (d. 1816), the founder of the well-known museum in Cambridge. Other noteworthy buildings include the Wesleyan Theological Institution for the training of students for the foreign missionary field: in the refectory is preserved John



[Photo: York & Son, Notting Hill.

RICHMOND, SURREY: VIEW FROM THE TERRACE.

Tower, and has been the delight and despair of painters from the time of J. M. W. Turner and even Wesley's pulpit from his chapel in Moorfields; the Town Hall; the Free Library; the Royal

Hospital, and several almshouses. Richmond Green, once the jousting and tourney ground, still contains some fine examples of houses erected in Queen Anne's reign. The Thames is spanned by a handsome stone bridge of five arches, communicating with Twickenham, and a lock—the lowest on the stream—was constructed here in 1894 partly with a view to hold up the water. Close to the Park, enviably situated on the verge of the hill, is the noted hostelry of the Star and Garter, now modernised, but a familiar haunt of Thackeray and Dickens and their readers. The White Lodge, a Crown residence in Richmond Park, has been occupied by several distinguished persons, among them Sir Richard Owen and Earl Russell, while it was the birthplace of Prince Edward of York in 1894. Richmond is almost wholly a residential town, but market-gardening, nurseries and brawling are carried on, and mention must be made of the Maid of Honour cakes that are a speciality of the place. Pop. (1901), 31,677.

Richmond, capital of Virginia, United States, on the left bank of the James, at the lower Falls of the river and at the head of tide water, 125 miles from the sea and 100 miles S.W. of Washington. In Capitol Square stands the State house or Capitol, dating from 1785 and designed in part after the Maison Carrée in Nîmes. Other prominent buildings are St. Paul's Church, the city hall, the State Library, the Governor's residence, Jefferson Davis Mansion—the so-called White House of the Confederacy (now a museum of Confederate relics)—the Masonic Temple, several important educational institutions and the Valentine Museum of antiquities and history. Richmond contains several notable examples of sculpture, among them J. H. Foley's statue of Stonewall Jackson, Thomas Crawford's group of Washington, Mercier's statue of General Robert Lee and Houdon's statue of Washington. There are numerous fine parks and the beautiful Hollywood Cemetery, in which much of the natural scenery has been preserved, where lie Presidents Monroe and Tyler, Jefferson Davis, Commodore Maury and John Randolph. The town is the headquarters of the tobacco trade and its manufactures include locomotives, agricultural implements, nails, horseshoes, machine-shop products, flour, boots and shoes, chemicals, paper, and woodwork, in addition to shipbuilding. The State capital since 1779, Richmond was made the capital of the Confederate States and witnessed the closing struggles of the Civil War, being entered by the Federals on April 3rd, 1865, after a prolonged resistance. Manchester, on the opposite bank of the river, connected with Richmond by several bridges, has cotton, paper, tobacco and other industries, and (1900) a pop. of 9,715. Pop. of Richmond (1900), 85,050.

Richter, HANS, musical conductor, was born at Raab, in Hungary, on April 4th, 1843. As a boy he sang in the choir of the Court chapel in Vienna and in 1859 attended the Conservatorium in that city, where he studied theory under Sechter and the horn under Kleinecke. In 1866 he became copyist to Richard Wagner, then living at Trieb-

schen, near Lucerne, and made the fair copy of the score of *Die Meistersinger*. In 1868 he was conductor at the Hof Theater, Munich, whence he went to Paris and Brussels, where he led the production of *Lohengrin* on March 22nd, 1870. In the same year he copied the score of the *Nibelungen Ring* for Wagner and in 1871 took up the post of conductor at the National Theatre, Budapest. In 1875 began his long connection with the Viennese Opera House. Next year he conducted the Festival at Bayreuth, which included the production of the *Ring*. In 1877 he produced the *Walküre* in Vienna and appeared in London in 1879 to conduct the Wagner concert in the Albert Hall. He was conductor of the



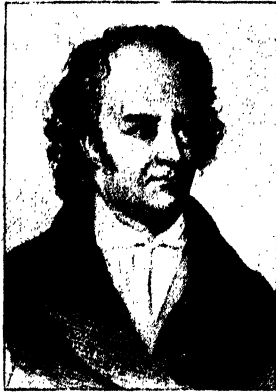
HANS RICHTER.

(Photo: Stereoscopic Company.)

Birmingham Festival in 1885 and next year received the honorary degree of Doctor of Music from Oxford University. Since then he has repeatedly conducted in London and elsewhere the concerts which bear his name, as well as Wagner's operas at Drury Lane and Covent Garden, and he succeeded Sir Charles Hallé in the direction of the Manchester Orchestra. As a conductor Richter is admittedly without a rival in Beethoven, Brahms, Wagner and the other great masters of the classical school.

Richter, JOHANN PAUL FRIEDRICH, usually styled JEAN PAUL, humorist, was born at Wunsiedel, Bavaria, on March 21st, 1763. Sent in 1780 to Leipzig University to study theology, he found himself irresistibly attracted to literature and began to cultivate it in the midst of constant privation. It says much for his disposition that the hardships he experienced left hardly any trace on his writings. His first productions are very immature and unreal

and are seldom read. He could find no publisher for some time, and to keep himself and his widowed mother he was obliged to work hard as a tutor. In 1793 *Die Unsichtbare Loge*, the earliest of his really original books, was brought out and was well received. The next, *Hesperus* (1792-4), is still considered by many to be his masterpiece. He began to develop his own peculiar style, and his sentimentality found enormous favour. By the publication of his *Leben des Quintus Fizelein* (1796)



JOHANN PAUL RICHTER.

and his *Blumen-, Frucht-, und Dornenstücke* (1795), he at once sprang into the front rank of German authors, and was for a long time distinctly the most popular of them all. He wrote on philosophy and other subjects for a while, married (1801), and settled in Baireuth (1804), and then produced some of his most amusing books, such as *Dr. Katzenberger's*

Reise (1809), as well as patriotic works of the stamp of his *Dämmerungen für Deutschland* (1809). Having done his best work, he retired on a small pension, and lived much by himself during his last years, which were saddened by his blindness and the death in 1821 of a cherished son. He died on November 14th, 1825. Richter was unquestionably one of the greatest of humorists, but he is sometimes merely maudlin in sentiment, and his diffuseness militates against his popularity; but there are passages of exquisite and almost unequalled beauty in some of his works, and Carlyle's admiration of him is well known. A complete edition of his writings appeared in 1826-38 in 65 volumes. The calmness and penetrating humour of his best works impress readers, and, despite certain manifest faults in them, his is one of the greatest names in German literary history. He is, however, not so widely read by his countrymen of the present day; but that is alike their misfortune and their fault.

Rickets (*Rachitis*), a disease of childhood, in which the bones do not assume their normal hardness, and are thus liable to yield unduly, with resulting deformity. In rickets there is ordinarily thickening of the joint ends of long bones, and there are often also enlargement of the liver and spleen, and general malaise. The abnormalities resulting from the yielding condition of the bones are most obviously displayed in curvature of the bones of the leg, with ensuing knock-knee, and in curvature of the spine, with exaggeration of the

normal curves, and frequently lateral rotation of the bodies of the vertebrae, again in the deformed condition of the thorax, which is known as "pigeon-breast," in the delayed closure of the fontanelles of the skull and in the prominences of the frontal and parietal eminences which are such characteristic appearances in the rickety cranium. There is usually, moreover, enlargement of the anterior extremities of the ribs, producing the beaded condition which is readily detected on passing the hand over the lateral aspects of the chest. Rickets manifests itself, as a rule, during the second year of life, and is often associated with conditions of poverty. It appears to be undoubtedly aggravated, if it be not actually caused by improper diet. The majority of cases of rickets occur in children brought up by hand, and in such cases cross-examination will probably elicit the fact that the most unsuitable articles of diet have been supplied to the child. Accordingly, the children of the poor are far more commonly affected than the children of the wealthy and well-to-do. Children reared in large towns are much more liable to be afflicted than country-born and bred bairns. The ailment is said to be so characteristic of England that in Germany it is called the "English disease." There is no foundation for the current notion that rickety children are mentally sharper than healthy children are. Since they cannot play much they spend more time with their elders and so may grow "old-fashioned," but the want of normal physical strength is bound to prevent their intellectual capacity from outpacing that of more fortunately-situated children. Treatment consists in the administration of nutritious diet, with tonic remedies, and especially cod-liver oil. Sea air is said to be particularly valuable in this malady. Some chemical foods which present a combination of iron, phosphorus and lime are valuable, and it is a great pity that oatmeal porridge is losing its old vogue in Scotland and elsewhere. It is an excellent bone-former and a nutritious food as well, and children readily become accustomed to it and like it. The reason porridge is not so general as it used to be is doubtless the trouble of preparing it—and it *must* be properly cooked—but such a trifling consideration ought not to be allowed to weigh against the importance to a growing child of a healthy constitution. It is necessary to do all that is possible to obviate strain upon the bones, such as would be calculated to increase deformity. Rickety children should be kept off their feet, and it may be essential to employ splints or other instruments in supporting weak limbs.

Riding, a word applied to each of the three sections into which the English county of Yorkshire—the county of broad acres—is divided. These are known as the North, East, and West Riding. Division has also been carried out in other English counties, but the sections are differently named. In Lincolnshire they are known as parts, in Kent as lathes, and in Sussex as rapes. It is interesting to note that "riding" should properly be "thriding," implying the "third part of a thing" (as a shire). It has been plausibly con-
 jec-

tured that the erroneous style arose from the careless division of the compound "North-thriding," which became corrupted into the current form "North Riding." But this theory fails to account for the forms East and West Riding.

Ridley, NICHOLAS, martyr-bishop, was born at Unthank Hall, near Willmotewick, in Northumberland, in 1500, though this date is a little uncertain. He studied at Pembroke Hall, Cambridge, the Sorbonne in Paris, and the University of Louvain. By 1530 he was again in Cambridge, where his attainments procured him the post of chaplain to the University. In 1538 Cranmer instituted him to the vicarage of Herne in Kent, and in 1540, when he took the degree of D.D., he was elected Master of Pembroke Hall. His favourite walk in the orchard is still called after him. At Cambridge he protested against Papal interference, and was made royal chaplain by Cranmer, and successively Prebendary of Canterbury, Canon and Bishop of Rochester (1547). In 1550 he became Bishop of London, and strongly objected to the use of holy water, and otherwise expressed pronounced views against such practices. He favoured Lady Jane Grey against Mary, who sent him to the Tower in 1553, and after eight months' imprisonment there he was taken to Oxford, tried, adjudged a heretic, and burnt with Latimer in front of Balliol College, on October 16th, 1555. He denied the doctrine of the Real Presence. He is described as "small in stature, but great in learning."

Rienzi, COLA DI (RIENZO), tribune, was born at Rome in 1313, and, though the son of an inn-keeper, managed to secure a good education. The eloquence which was perhaps his most notable characteristic came to him in early youth, and, as a warm admirer of Petrarch, he shared that poet's views of the ancient glories of the Eternal City, and imagined it possible to restore its former prestige. He was sent with Petrarch to Pope Clement VI., who was at Avignon, and was made Vicar-Apostolical. Recognising the misery of the people of Rome, he championed their cause, and became immensely popular. He was crowned tribune, and in May, 1347, the people formed a republic, with, curiously enough, the consent of the Pope. Rienzi governed well for a time, but made various mistakes and, when his dictatorship became insupportable, fled to Naples at the end of December, 1347. For over two years he remained in seclusion in the Abruzzi but, his dreams regaining their old sway, went to Prague in 1350 to win over the incoming Emperor Charles IV. He was despatched to the new Pope, Innocent VI., at Avignon, and was sent to Rome along with Cardinal Albornoz who, the real head of affairs, was yet to profit by Rienzi's popularity. They reached the Seven-Hilled City on August 1st, 1354, and were greeted with acclamation. For a brief interval all went well till Rienzi, pressed for money, put Fra Monreale to death at a banquet for the sake of his wealth. That foul deed was too much even for the hardened opinion of Rome. Public indignation gradually gathered head and finally broke out into revolt on October 8th, 1354. The crowd surrounded the palace clamouring

for Rienzi, who in disguise mixed with the mob, but being recognised was instantly slain. His fortunes formed the subject of an opera by Richard Wagner and a romance by Lord Lytton.

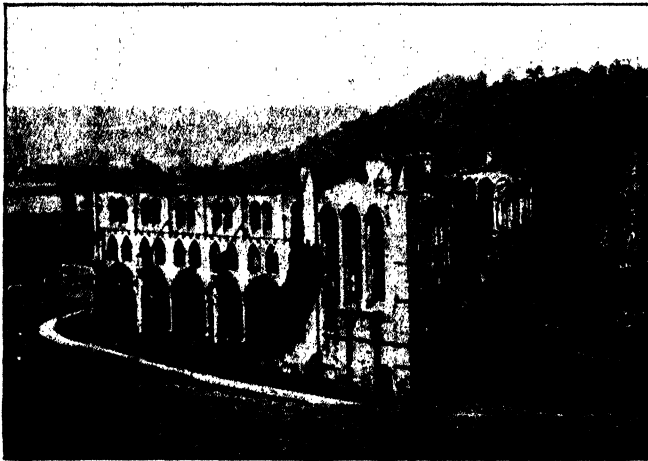
Riesengebirge (or "Giant Mountains") belong to the Sudetic chain, and separate Prussian Silesia from Bohemia and Moldavia, joining the Carpathian system, though the name is sometimes confined to the range between the sources of the Neisse and Bober, measuring 24 miles in length with a breadth of 15 miles. There are picturesque valleys and lofty peaks, *e.g.*, Schneekoppe (5,265 feet), Brunnenberg (5,072 feet), and Hohe Rad (4,968 feet). On the northern face, rising from the Hirschberg valley, the range presents a precipitous front, but on the southern or Bohemian side the slope is more gradual. The three passes are, on the west, from Hirschberg to Reichenberg, in the centre, from St. Peter to the Upper Elbe valley and, on the east, from Landeshut to Frauentau. The Elbe pierces the range from Bohemia and the Iser, Bober and other rivers have their sources in or near the mountains. Various parts of the hills are favourite summer resorts and Rubezahl (or "Number Nip") is a demon who makes his home the recesses of the Riesengebirge.

Rievaulx Abbey, situated in the valley of the Rye, 3 miles N.W. of Helmsley and about 25 miles N. of York, Yorkshire, England. The abbey, dedicated to the Virgin, was founded for Cistercian monks in 1131 by Walter Espee, who afterwards became a monk here himself and was buried within the precincts in 1153. The abbey is now a picturesque ruin, romantically placed amidst venerable trees and sheltering hills. Owing to the site on a rapidly-sloping hill, the church was built from north to south. Of the nave only a few fragments survive. The lower part of the transepts is Norman, the upper part and the choir being Early English. The southern arch of the crossing, 75 feet high, remains a striking feature. Of the choir there are extant the arcades, triforium, and clerestory, the south gable with buttress turret, and portions of the aisle walls and their flying buttresses. The work, the design of which recalls that of Whitby, is extremely beautiful. Rievaulx is the Norman French for Rye Vale. (*See p.* 312.)

Rifle, a kind of firearm whose peculiarity consists in the barrel being grooved instead of smooth-bored, the grooving having more or less of a twist, thus ensuring greater accuracy of flight for the bullet, since it bores, as it were, its way through the air, and presents every side of the projectile in turn to the lateral resistance. The principle is not new, and was known on the Continent in the 15th century, but was not introduced into the British army till the American War of Independence, the Americans being the first demonstrators of its superiority. The weapon was not used generally in the British army till about the time of the Crimean War. The first improvement in it was the introduction of the elongated bullet, which underwent various modifications tending to a greatly-enhanced range and accuracy.

The Enfield rifle, which on the introduction of breech-loading was converted into the Snider, gave place to the Henry-Martini, and this, although a most serviceable weapon, was in turn superseded by the Lee-Metford magazine rifle. The tendency of modern improvements has been in the direction of increasing the twist of grooving to a degree once thought inadvisable, and of diminishing the calibre, the net result being a greater degree of penetration, a longer range, and a lower trajectory. In 1858 the principle was applied to cannon, both Lord Armstrong and Sir Joseph Whitworth having been very successful in their manufacture.

Rifle-Bird (*Ptiloris paradisus*), one of the Plume-birds from South-Eastern Australia and New Guinea. The popular name is said to have been given by the early settlers, who saw in the



RIEVAULX ABBEY (p. 311).
(Photo: Chester Vaughan, Acton, W.)

plumage of the male (velvety black above and olive-green below) some resemblance to the uniform of the Rifle Brigade, one of the British infantry regiments.

Riga, seaport and capital of the government of Livonia, seat of the governor-general of the Baltic Provinces, Russia, on the Southern Dwina (or D  na), five miles from its mouth in the Gulf of Riga, 312 S.W. of St. Petersburg. It is situated on a sandy plain surrounded by hills and has extensive suburbs. The modern town is well built, has good squares, wide quays, an esplanade, and gardens, and the river is crossed by a bridge of boats. Among the chief buildings are the cathedral, St. Peter's church (with a spire of 440 feet), the Ritterhaus, Exchange, town-hall, polytechnic institute, municipal library and museum, and school of navigation. The chief industries are the manufacture of starch, soap, cards, artificial flowers,

machinery, railway cars, beer and brandy, and there is a very extensive export and import trade, and numerous vessels frequent the port. Pop. estimated, 283,000. The GULF OF RIGA washes the coasts of Courland, Livonia and Esthonia, and is 120 miles long by 70 broad. The navigation is dangerous, and on the north-west the gulf is almost closed by the island of Oesel. The Southern Dwina flows into the gulf.

Right Ascension. [ASCENSION, RIGHT.]

Right of Way. [WAYS.]

Rights, BILL OF, a declaration delivered by the Lords and Commons of the British Houses of Parliament to the Prince and Princess of Orange, February 13, 1689, and afterwards enacted in Parliament when they became king and queen. It

sets forth that King James, by the assistance of evil counselors, endeavoured to subvert the laws and liberties of the kingdom by exercising a power of dispensing with and suspending of laws, by levying money for the use of the Crown by pretence of prerogative without consent of Parliament, by prosecuting those who petitioned the king and discouraging petitions, by raising and keeping a standing army in time of peace, by violating the freedom of election of members to serve in Parliament, by violent prosecutions, and the causing partial and corrupt juries to be returned on trials, excessive bail to be taken, excessive fines imposed, and cruel punishments to be inflicted, all of which were declared illegal. The declaration concludes in these remarkable words:—"And they do claim, demand, and insist

upon all and singular the premises, as their undoubted rights and liberties." The Act of Parliament above referred to (1 Will. & Mary, statute 2, c. 2) itself recognises "all and singular the rights and liberties asserted and claimed in the said declaration to be the true, ancient, indisputable rights of the people of this kingdom."

Rigi, an isolated peak in the canton of Schwyz, Switzerland, between the Lakes Zug and Lucerne. Rising to a height of 5,900 feet, it commands a panoramic view scarcely surpassed in a country where such prospects are numerous and splendid. Tourists ascend to the summit (Rigi Kulm) by railways worked by means of a toothed wheel and rail.

Rigidity, that property possessed by a solid which causes it to experience no deformation or strain when a stress is applied to it. The fraction

stress—the co-efficient of rigidity—in this case is strain infinitely great. No substance is, however, perfectly rigid. Every substance yields under the action of a stress if we take small enough masses of them, such as thin wires; but some solids, such as steel, have a very large co-efficient of rigidity, and unless a considerable stress is applied to them the corresponding strain is too small to be observed.

Rigor Mortis, the condition of rigidity which affects the muscles of the body after death, brought about by the coagulation of the myosin, which is an important constituent of muscle. The muscular fibres become shortened, and there is consequent contraction, associated with the general stiffening. Rigor mortis usually begins within an hour or two after death, and extends, generally speaking, from above downwards. The relaxing of the body as the rigor passes away is the earliest intimation that decomposition has set in. Rigor comes on more or less rapidly according to climate and temperature, and is also affected by the nature of the disease that caused death. In the Tropics and after certain diseases, it is slight and brief and in some cases hardly appreciable.

Rigsdag. [DENMARK.]

Rimini (Roman *Ariminum*), a town of the province of Forlì, Italy, on the Marecchia, near its mouth in the Adriatic, 31 miles S.E. of Ravenna. The principal buildings include the splendid cathedral of San Francesco, founded in the 13th and rebuilt in the 15th century, the church of St. Giuliano with an altar-piece by Paul Veronese, the church of St. Girolamo, the town hall with picture gallery, the communal palace, the archaeological museum and the Palazzo Russo in which Francesca la Rimini, immortalised by Dante, met her fate in 1285. Of the Roman period there yet remain, in excellent preservation, the five-arched bridge of white marble built across the Marecchia by Augustus, and a fine triumphal arch of Augustus, besides fragments of an amphitheatre. The manufactures comprise silk, glass, ropes, earthenware and furniture, and the salt-refineries and fisheries are of importance. Founded by the Umbrians, Rimini rose to some prominence under the Romans, being the terminus of the Flaminian Way from Rome and the Æmilian Way from Placentia (Piacenza). It suffered somewhat at the hands of the barbarians in the 6th century and in the Middle Ages acknowledged the rule of the powerful family of Malatesta. Pop., 43,000.

Rinderpest. [CATTLE PLAGUE.]

Rinds, a numerous people of Baluchistan, at the extreme west of British India, especially in the province of Kachi and in the Mand district of the province of Makran. They are usually classed as one of the three great branches of the Baluchi family, but appear to be originally of Jat stock with a slight infusion of Arab blood (hence their claim to Arab descent). They are Mohammedans and speak the Northern Baluchi dialect.

Ring, specifically, a circlet of gold, or other metal, worn as an ornament on the finger, in the ear, on the nose, or other part of the body. Rings have been worn by mankind at least from the age in which metals began to be worked. They were in vogue among the Assyrians, the Egyptians (who used a great variety of rings and displayed much artistic taste in their manufacture), the Greeks, the Romans, and indeed among most civilised peoples. Whether the ring was at first symbolic of eternity or of sexual relations is a matter of doubt, but it was early employed as a sign of authority, dignity, and honour. Jupiter gave Prometheus a ring, Pharaoh confirmed Joseph's authority by a ring, bracelets and rings were presented by Eliezer to Rebecca. Among the Romans wearing a ring was a privilege of the equestrian order, and at a later period gladiators wore bracelets. With the Anglo-Saxons a ring round the neck was a sign of servitude. It is a matter of doubt whether this was not the origin of the use of a ring in betrothal and marriage. Much superstition has collected round the use of rings. The practice of engraving mottoes or "posies" in rings prevailed in the 16th century, and has been revived in the "Mizpah" rings of our own time, while mourning rings are still occasionally given as memorials of the dead. The presentation, on certain occasions, of rings once prevailed in the Inns of Court, London.

Ring, a combination of persons for securing, generally by corrupt and unscrupulous methods, a variety of ends such as the controlling of the market in stocks, or the price of a commodity, or the engineering of a municipal or other election in order to promote the return of a certain party with the object of vesting the "fat" offices in the gang who have "nobbled the machine." In the United States office-seekers are not unknown. They are persons, not necessarily either dishonourable or dishonest, who make a living by office. They plan to obtain a working majority on executive committees and, as the Right Hon. James Bryce says, in his *American Commonwealth*, "cement their dominion by combination, each placing his influence at the disposal of the others, and settle all important measures in secret conclave." No ring for nefarious political practices would be possible in any community the members of which recognised it to be their duty to take an active part in local self-government.

Ringan, St. [NINIAN.]

Ring-Dove. [PIGEON.]

Ringed Snake, THE (*Tropidonotus natrix*), is found in most of the countries of Europe, including England and Scotland. It does not occur in Ireland and it seems that attempts to introduce it there have failed not from any climatic peculiarity, nor from the sacredness of the soil, but from the prejudices of the people, who will not permit the creatures to survive. Being frequently found in the vicinity of water—for it is an expert swimmer—it is sometimes known as the Water Snake. The upper parts are brownish-grey, marked with black; there is some yellow on the head, and the under

parts are lead-blue, sometimes marked with black. It is from three to four feet long. These snakes, which are quite harmless, feed on frogs, small fish, lizards, birds and their eggs, and mice. They are very partial to sunny banks and heaths where the grass is long and a pond is at hand. On the slightest alarm they vanish like a flash. When hungry they pursue their prey with relentless rapidity. They slough their skins twice or oftener every summer, according to the temperature and the rapidity of growth. Towards the end of autumn they retire to a sequestered and sheltered spot, where, coiled up with a number of their fellows, they sleep during the winter. This hibernation lasts until the warmth of spring sets in. The snake is said to be readily tamed and can be taught to recognise its feeders, keepers and friends.

Ring-Ousel (*Turdus torquatus*), a well-known bird of the Thrush family, rather larger than a blackbird, from which it differs in its black bill and its white gorget. It is a native of Western Europe, visiting Great Britain in the spring, remaining to breed, and generally leaving in the autumn. The nest is usually made in heathy bunks, and two broods are sometimes reared. It feeds on insects, worms, molluscs, berries and fruit.

Ringwood, a town of Hampshire, England, pleasantly situated on the Avon, 21 miles W. of Southampton. The church of St. Peter and St. Paul, though founded in the 13th century, has been almost wholly reconstructed. The east wall has been adorned with paintings in commemoration of the family of John Keble, the poet of *The Christian Year*, who married a daughter of a former vicar. Other buildings include the town hall, corn exchange and Carter Lecture Hall. The manufactures include the knitted woollen gloves known as "Ringwood," linen collars and cuffs, in addition to brewing, saw-mills and the making of agricultural implements. The Romans had a military post here, and the Duke of Monmouth was brought here a prisoner (captured at the spot close by called The Island) after the battle of Sedgemoor in 1685. The Avon is a good fishing stream, salmon and trout frequenting it. Pop. of parish (1901), 4,629.

Ringworm, a skin disease, due to the growth of a fungus known as the *Trichophyton tonsurans*. It must be borne in mind that it is extremely contagious. Ringworm frequently affects the scalp in children, causing loss of hair in patches, with the formation of circumscribed areas in which broken-off stumps of hair are left like stalks in a stubble-field. Ringworm sometimes occurs in adult males, affecting the hairy parts of the face, and is then known as sycoosis, or "barber's itch," being usually conveyed by means of an infected shaving-brush or razor. The hair follicles become swollen and form red, painful nodules, in which matter collects, a hair piercing each. The discharge and scurf gather on the surface, producing thin crusts. Ringworm also at times affects the body, producing raised patches, with a reddened and elevated margin. The treatment of ringworm consists in destroying the parasitic fungus by which the

disease is caused. The affected surface must be kept closely-shaven, scrupulously clean, and to it must be applied some form of parasiticide, such as pitch-ointment or oil of cade. In the case of ringworm affecting the body, liniment of iodine should be applied to the spots every morning until it produces a little soreness, when it may be discontinued for a day or two. If this is not effectual a small quantity of blistering fluid may be applied and sulphur ointment is also useful. In "barber's itch," the crusts must first be softened with bread-and-water poultices and then removed. The affected hairs must next be carefully extracted with forceps, to give free passage to the discharge and enable a mixture of equal parts of sulphur ointment and lanoline to reach the roots of the diseased follicles. Care should be taken to see that razors are thoroughly washed in hot water before use, and that the skin is well sprayed after shaving.

Rio de Janeiro, a state of Brazil, bounded on the S.W. by São Paulo, on the W. and N.W. by Minas Geraes, on the N.E. by Espírito Santo, and on the E. and S.E. by the Atlantic. It occupies an area of 26,630 square miles. The coastal district is low-lying, but the interior is mountainous, the loftiest summits being found in the Organ Mountains, the Serra do Mar and, on the western border, the Serra da Mantiqueira. The Parahyba is the principal river. The soil is rich and yields cacao, coffee, cotton, indigo, maize, sugar and medicinal and dye woods, besides timber economically valuable. Petropolis, the capital (9,000), has breweries and manufactures of silks, cottons and cigars. Pop. (estimated), 1,250,000.

Rio de Janeiro, sometimes simply called Rio, the capital of the republic of Brazil and, next to Buenos Aires, the most populous city of South America, situated on the west wing of the bay of that name on the east coast of Brazil. It presents a beautiful aspect from the sea, one of the first objects seen being the Sugar Loaf, which rises, at the south-western entrance to the bay, directly from the water to the height of 1,000 feet. To the north, beyond the city, the bay, studded with islands, opens out from its mile-wide mouth into an oval basin about 20 miles long from south-west to north-east, with a maximum width of over seven miles, its coast-line exceeding 60 miles in circumference. Antonio Gallenga called it "the very gate to a tropical Paradise," and by common consent it is allowed to be one of the most magnificent in the world; Rio de Janeiro is built partly on an island and partly on the mainland, and is protected by forts. The old part is on flat land, but the newer quarter is erected on the slopes of the hills which rise above the town and are interspersed with valleys. To the north well-timbered and cultivated ground runs into the interior as far as the Organ Mountains. The houses are of granite, with upper storeys of wood and tiled roofs. The streets are for the most part paved and have raised pavements. The principal buildings include the Senate House, the City Hall, the Exchange, the Misericordia Hospital, the Academy of the Fine Arts, the Museum, the Polytechnic and Medical Institutes, the Arsenal, the

Imperial College, Library and the Botanical Gardens at Botafogo with a far-famed avenue of palms. One of the finest features of the town is the aqueduct, which, supported on a double row of 42 arches, brings water from Mount Corcovado in the south-west. The noble roadstead—deep, extensive and well-sheltered—is one of the best in the world, and the wharf accommodation is extensive. The chief manufactures are woollens and other textiles and flour, and the export and import trade is large,

principal affluents are the Pecos on the left and, on the right, the Conchos, Salado and Salinas. In several districts its water is used for irrigation. The drainage area is estimated at 250,000 square miles.

Rio Grande do Norte ("Grand River of the North"), a maritime state of Brazil, having the Atlantic on the N. and E., Parahyba on the S., Ceara on the W., and containing 22,190 square miles.



RIO DE JANEIRO.

the former consisting of coffee and other produce from the interior. Rio was discovered on New Year's Day, 1531, by Alphonso de Souza, a Portuguese captain, who, under the impression that he had struck the estuary of a river, called it Rio de Janeiro, that is, the River of January. It was next settled by Huguenots in 1558, but Villegaignon, their leader, became tyrannical and many of the refugees returned to Europe and prevented further emigration. The Portuguese drove out the remnant and established in 1567 a footing which they maintained permanently. In 1763 it was made the capital of the viceroyalty in preference to Bahia, became the capital of Brazil in 1822, and took the lead in the Revolution of 1889, which overthrew the monarchy and established the republic. Pop. (estimated), 750,000.

Rio Grande del Norte ("Great River of the North"), a river of the United States, rising in the San Juan Mountains, in the south-west of Colorado, flows first in an easterly and then in a south-easterly direction, and enters the Gulf of Mexico after a course of 1,800 miles. It traverses the San Luis Valley, New Mexico, and from about 32° N. serves as the boundary between Texas and Mexico. Considering its length, the volume of water brought down is small and the stream is shallow in many parts and obstructed by rapids and sandbanks. Its

Mountainous in the south and west, the land descends in the north and east to a flat sandy shore. The coast is dangerous on account of its shoals, and the rivers include the Rio Grande (from which the state takes its name), the Sirido and Apody. The chief productions are coffee, cotton, sugar-cane and manioc, and large numbers of cattle and horses are reared. The country also yields resin, gums, balsam, and dye-woods, and among the minerals are gold, silver, iron, salt, crystal, sandstone, limestone and granite. Natal, the capital (50,000), does a considerable export trade in coffee, sugar and cotton. Pop. (estimated) 400,000.

Rio Grande do Sul ("Grand River of the South"), a maritime state of Brazil, bounded on the N. by Santa Catharina, on the W. and S.W. by the Argentine Republic, on the S. by Uruguay, and on the E. by the Atlantic. It covers an area of 91,250 square miles. It is well watered, the chief river being the Jacuby. The coastal district is flat, the centre mountainous, Serra Geral being the highest elevation, and the west is occupied by plains. The south-eastern seaboard is flanked by Lago Mirim and Lake Patos. The soil is fertile and produces grain, rice, potatoes, beans, onions, maize, sugar, coffee, tobacco, and maté, or Paraguayan tea. Cattle, horses and mules are raised in great numbers. Porto Alegre (90,000) does a large export

trade in cattle, hides, tobacco and maté. Pop. (estimated) about 1,000,000.

Rio Negro, a river of South America, rising in the south-east of Colombia, about the parallel of 2° N., where it bears the name of the Guainia. It pursues at first an easterly direction, and then bends round to the south-east, forming for some distance the south-western boundary of Venezuela, and ultimately falling into the Amazon just below Manaus, after a course of 1,400 miles. Its principal tributaries are, on the left, the Atabapo, the Cassiquiare (by means of which most valuable communication is established between the Amazon and the Orinoco), the Padauri and the Rio Branco and, on the right, the Vaupes. At its mouth it is a mile and a half wide, somewhat higher up it has a width of nine miles, while near Barcellos it is almost fifteen miles wide.

Rio Negro, a river of the Argentine Republic, South America. It is formed by the junction of the Limay and Neuquen rivers, both of which rise in the Andes, and after a mainly easterly course of 400 miles empties itself into the Atlantic. The length to its remotest source is calculated to be 650 miles. It has a rapid current, and shallows and islets are numerous. In the lower reaches the banks are fertile.

Riot. When three or more persons associate together with intent mutually to assist one another against anyone who opposes them in the execution of some private enterprise with force or violence against the peace, or to the manifest terror of the people, whether the act intended were of itself lawful or unlawful, and although they depart of their own accord without doing anything, this is an unlawful assembly. If, after their first meeting, they move forwards towards the execution of their intended purpose, whether they actually execute that purpose or not, this is a rout, and if they put it into execution then it becomes a riot; and if any person encourages, promotes, or takes part in such riot, whether by words, signs, or gestures, or by wearing the badges or ensigns of the rioters, he is considered a rioter. The Riot Damages Act, 1886, provides compensation out of the police rates of the district to owners of property riotously injured, stolen, or destroyed. Among the more noted riots (so-called) were the Porteous Mob in Edinburgh (1736), the No Popery riots fomented by Lord George Gordon, in which Newgate Jail was burned down (1780), the O. P. riots at Covent Garden, which ceased only when the old prices (hence the name) were restored (1809), the Luddite riots, caused by the introduction of machinery (1811-12), the Peterloo Massacre at Manchester (1819), the Chartist riots at Newport (1839), the Rebecca riots in South Wales (1843), the Reform riots at Hyde Park, when the railings were pulled down (1866), and the looting of the London West End by a mob of residuum (1886).

Rio Tinto, a river of southern Spain, in the province of Huelva. Near its source are productive copper-mines, which are worked by a foreign syndi-

cate, and employ 10,000 people, who handle nearly two million tons of ore annually. The metal is carried by railway to Huelva, near the mouth of the river, and thence exported.

Ripon, a city of the West Riding of Yorkshire, England, on the right bank of the Ure, here crossed by a stone bridge of 14 arches, 22 miles N.W. of York. Around the city is a district of some 30,000 acres in which since Saxon times the Archbishop of York has held jurisdiction, known as the Liberty of Ripon, or Riponshire. The sounding of the mayor's horn was one of the most ancient customs in England. Formerly it announced the setting of the watch—the chief officer till 1604 bearing his Saxon designation of Wakeman—but has now given place to the sounding of three blasts every night at nine o'clock before the mayor's residence, and three more at the market cross. The cathedral bell is also rung at the same hour, being the present-day survival of the custom of the curfew. The see was erected in 1836, and in 1888 the diocese was reduced in area by the creation of



THE CATHEDRAL, RIPON.
(Photo: C. Watson, Ripon.)

the see of Wakefield. The cathedral, dedicated to St. Peter and St. Wilfrith, is a cruciform structure, with large central tower and two towers flanking the west front, of many styles. Under the great central tower is the Saxon crypt known as St. Wilfrid's Needle. The chapter-house, vestry and crypt beneath are Norman. The transepts, portions of the nave and choir and other parts are Transition, the west front and towers are Early English; parts of the choir and east end are Decorated, and portions of the choir, choir-screen, south transept, central tower, nave and library are Perpendicular. The cathedral measures internally 270 feet, the nave 87 feet, the transepts 132 feet, and the height varies from 79 feet to 88 feet. The other prominent buildings are the Bishop's Palace, the deanery, the free grammar school, founded by Edward VI. and reorganised in 1872, the Diocesan Female Training College, the Bluecoat School, the Town Hall, the Public Rooms and Victoria Hall, and the Mechanics' Institution, besides several ancient hospitals and

almshouses. In the market-place stands the stone obelisk, 90 feet high, erected in 1781 by William Aislabie, for sixty years M.P. for the borough. The annual celebration of St. Wilfrid (Wilfritt), the patron-saint, is usually held on the first Saturday in August, when a grand procession with flags, banners and music perambulates the streets, the most conspicuous feature in the pageant being the horseman, representing the saint, who is arrayed in archiepiscopal vestments and mitre and bears a crozier. Pop. (1901), 8,230.

Ripon, FREDERICK JOHN ROBINSON, VISCOUNT GODERICH, 1ST EARL OF, statesman, was born in London on October 30th, 1782. He was educated at Harrow and St. John's College, Cambridge. He studied for the bar, but was never called. In 1806 he was elected M.P. for Carlisle, but in the following year he was returned for Ripon, which he continued to represent till his elevation to the peerage in 1827. After filling several subordinate posts he became President of the Board of Trade in 1818, and in 1823 he was made Chancellor of the Exchequer. His first budget was well received, and he obtained grants for buildings at the British Museum for the accommodation of the Royal Library. His second budget also won favour, and he secured £57,000 for the purchase of the Angerstein pictures which formed a nucleus for the national collection. He still proceeded to reduce taxation in his third budget (1825), but his sanguine views about the state of the country in 1826, in spite of prevalent deeply-rooted distress, became irksome to the Commons, and in 1827 he was transferred to the Upper House as Viscount Goderich. Canning made him Secretary for War and the Colonies with the leadership of the Lords, and, on Canning's death, he became Prime Minister, a post for which he possessed no qualifications whatever and which he resigned on January 8th, 1828. Under Lord Grey he became Secretary for War and the Colonies (1830), an office which he exchanged for that of Lord Privy Seal. He resigned in 1834 because he could not approve of any attack on the English Church in Ireland. He remained out of office till 1841, when he accepted the Presidentship of the Board of Trade under Sir Robert Peel, who transferred him to the Board of Control for India in 1843, to make room for W. E. Gladstone at the Board of Trade. Ripon moved the second reading of the Anti-Corn Law Bill in 1846, and resigned office on the overthrow of Peel. He died at Putney Heath on January 28th, 1859. He was a well-meaning, amiable, upright, irresolute man, who lives in history chiefly as the "Prosperity Robinson" (in allusion to his optimism at the Exchequer) and "Goody Goderich" (because of his want of vigour Colonial Secretary) of William Cobbett's gibes.

Ripon, GEORGE FREDERICK SAMUEL ROBINSON, 1ST MARQUIS OF, statesman, was born in London on October 24th, 1827. He sat in the House of Commons for Hull (1852), Huddersfield (1853), and the West Riding of Yorkshire (1857), going to the House of Lords on the death of his father in 1859. In 1863 he became Secretary for War, and in 1866 Secretary for India. From 1868 to

1873 he was Lord President of the Council. In 1869 he had received the Garter, and in 1871 had acted as chairman of the Commission on the *Alabama* Claims which drew up the Treaty of Washington, being raised to the marquise in recognition of his services. Elected Grand Master of the Freemasons in 1871, he was obliged to resign the office in 1874 on his conversion to Roman Catholicism. In 1880 he was appointed Governor-General of India, his rule being particularly distinguished by consideration for the sentiment and welfare of the natives. This office he filled with unusual acceptance till 1884, in spite of the bitterest attacks of the Anglo-Indian community. In 1886 he was First Lord of the Admiralty, and from 1892-5 Colonial Secretary. He was Mayor of Ripon in 1895-6. On the accession of the Liberals to power in 1906, the Marquis became Lord Privy Seal and leader of the House of Lords in the administration of Sir Henry Campbell-Bannerman.

Ripple-Mark, an undulation of the surface of sand or other fine-grained rock produced either directly by the action of the wind upon the surface when wet, or indirectly by its action on shallow water. In either case the rippling consists of alternating long slopes to windward and short steep slopes to leeward. If slightly sun-baked between tides, a fresh layer of sediment may preserve a ripple-mark, and we find hundreds of feet of sandstones thus rippled throughout and evidencing steady subsidence keeping pace with deposition. When *in situ* ripple-marked beds tell us the direction of the wind when they were laid down. The under-surface of the next layer will present a cast which has been termed a negative ripple-mark. Ripple-marks are often associated with sun-cracks, rain-prints, and foot-prints, all signs of shore conditions.

Rip Van Winkle, the subject of the best-known paper in Washington Irving's *Sketch-book* (1819). He is a ne'er-do-weel living in a village on the Hudson, and flees from his termagant wife to the Catskill Mountains. There he encounters Hendrik Hudson and his men playing ninepins. He bronches a keg and the liquor overpowers him. When he wakes he finds himself and all around him changed. His wife is dead and buried, his daughter married, his native village remodelled. He has in point of fact been asleep for twenty years, and naturally a good many things have happened in that time. The strangest event of all is that his own country has ceased to belong to England and has become the free and independent United States. Rip is identified by some of his old mates, and he lives happily with his daughter for several years. The story has been dramatised, but the only version that held the stage for a period was that of Dion Boucicault, which owed everything to the genius of Joseph Jefferson (1829-1905), who created the title rôle.

Ristori, ADELAIDE, [actress, was born at Cividale, in Friuli, Italy, on January 29th, 1822. She was trained for the stage at an early age, and made a great sensation in *Francesca da Rimini* when

14 years old. Other remarkable impersonations were those of "Mary Stuart" (1840), "Queen Elizabeth" and "Lady Macbeth." In 1847, on her marriage to the Marquis Capranica del Grillo, she retired from the stage for a short period. In 1855 she made her *début* in Paris as "Francesca," and won universal plaudits, though Rachel was then in her glory, and in the following year appeared in London with equally conspicuous success. She made three tours in the United States, during one of which she played "Lady Macbeth" to the "Macbeth" of Edwin Booth. At the time of the Dante celebrations in Florence in 1865, she took part, along with Tommaso Salvini and Ernesto Rossi, in a performance of *Francesca da Rimini*. She retired from the stage in 1885, but lived to an honoured old age, dying in Rome on October 9th, 1906.

Ritschl, ALBRECHT, theologian, was born at Breslau, Prussian Silesia, on March 21st, 1822, and studied at Bonn and Halle. He came under the influence of the Tübingen school, as his *Origin of the Old Catholic Church* shows, but in the second edition he discards the fundamental positions of his master Baur. In 1853 he became professor of theology at Bonn, and in 1861 at Göttingen, where the rest of his life was spent and where he died, on March 28th, 1889. His *Addresses on Religion* are marked by the influence of Kant and Schleiermacher, and finally, in 1864, he became impressed by the teaching of Lotze. In *Justification and Reconciliation*, published in 1870-4, and with important revisions in 1888, he expounds a system of theology which gives prominence to the practical side of Christianity. While doubting the possibility of demonstrating the existence of God to the speculative intellect, Ritschl held that He is really revealed to those who realise their need of Him. God is to be thought of as love Whose purpose is the moral organisation of mankind in the Kingdom of God, the community founded by Christ, in which alone humanity can be reconciled to Him. This reconciliation Christ wrought not by vicariously suffering the punishment due for sin, but by His perfect fulfilment of the work of His calling and patient endurance of suffering even unto death. At first Ritschl's teaching met with hostile criticism, but it won its way rapidly, and among his adherents were Bender and Harnack.

Ritschl, FRIEDRICH WILHELM, philologist, was born at Grossvargula in Thuringia, on April 6th, 1806, and educated at Leipzig and Halle. He made a special study of classical philology, took his degree in 1829, and became a professor at Breslau in 1834. After a tour through Italy he received the appointment of professor of classical literature at Bonn (1839), and between 1848 and 1854 published what is considered his greatest work, his edition of Plautus, remarkable for its wealth of learning and acumen. In 1854 he was made chief librarian and director of the Art Museum and Museum of Antiquities, and in 1865 removed to Leipzig as professor of philology. He died at Leipzig on November 9th, 1876. He was eminent for his knowledge of Latin inscriptions, and his work on

that subject (*Priscæ Latinitatis Monumenta Epigraphica*, 1862) is of great value. As a teacher, too, he was noteworthy, it being calculated that forty of his pupils became famous German *sarants*.

Ritson, JOSEPH, antiquary, was born at Stockton-on-Tees, England, on October 2nd, 1752, and was educated in his native town. He was trained to the law, and settled in London in 1775 as a conveyancer. He had already given evidence of marked eccentricity. At the age of 20 he turned vegetarian and developed a bitter and cantankerous temper, which he displayed to the full in his *Observations on the three first volumes of [Warton's] "History of English Poetry"* (1782), and next year he assailed with similar virulence Johnson and Steeven's edition of Shakespeare. He was an industrious collector of chap-books and old ballads, in the collation and revision of which he displayed unusual care and accuracy. His *Select Collection of English Songs* appeared in 1783, and his *Ancient Songs from the Time of Henry the Third to the Revolution* in 1792, the latter disfigured by an attack on Bishop Percy. His best service to English literature was rendered by his exhaustive collection of the ballads of *Robin Hood* (1795). His labours gained him the acquaintance of Sir Walter Scott, whom he sometimes visited and who was almost the only man who could tolerate him. He died in London on September 23rd, 1803.

Ritualism, or the strict observance of ceremonies, has prevailed in all times and among all nations, though it is often applied only to the observance of religious rites. The "trooping of the colours" in London may be taken as an instance of military ritualism; but in modern times the word is specially used to signify the great importance attached to ceremonial, as embodying certain doctrinal truths, by a section of the Anglican Church. The Public Worship Regulation Act of 1874 was passed for the purpose of restraining the exuberance of the more audacious of the clergy. For several years it seemed to have attained this end, but abuses in the Church ceremonial having again become notorious, a Commission of inquiry was appointed and reported in 1906.

Rive de Gier, a town of the department of Loire, France, on the Gier, a tributary of the Rhône, 13 miles N.E. of St. Etienne. It is situated in one of the richest coalfields in the country, in which over 50 mines are in operation. There are also extensive manufactures of glass, iron and silk. The town was in existence in Roman times, and the coal has been worked since the reign of Henri IV. Pop. (1901), 16,000.

River, a stream of water flowing over a portion of the earth's surface and discharging into the sea, a lake, or other river. Rivers generally have their source in springs, or from the melting of snow and ice on the summits of the highest mountains. The most rapid movement is at the surface, friction retarding the lower current. A velocity of 3 inches a second at the bottom of a river is sufficient to tear up fine clay, 6 inches a second moves fine sand, 12 inches a second fine gravel, and 3 feet a second

stones as large as an egg. When a river is in flood, or spate, its transporting power is very great. The material carried by it is deposited in the estuary at its mouth, and tends to form a delta. The course of a few rivers is almost wholly subterranean, and the corrosive power of some streams is powerful enough to alter the whole face of the country over which they run, as is shown in the American State of Colorado.

Rivers. ANTHONY WOODVILLE, BARON SCALES AND 2ND EARL, courtier and statesman, was born in or about 1442. His sister Elizabeth was queen of Edward IV., and he was himself the guardian of the young Prince Edward. His position excited envy in other nobles, which was heightened by his ambition. When the king died, Rivers made preparations to place the young prince on the throne, but was frustrated by the Duke of Gloucester, who caused him to be executed, without trial, at Pontefract on June 25th, 1483, and usurped the throne under the title of Richard III. Rivers had been Governor of Calais and captain-general of the king's forces, and was also the friend of William Caxton, the printer, for whom he translated the *Dictes and Sayings of the Philosophers*, the first book printed in England (1477). A few other translations by Rivers were issued from Caxton's press.

River-Terrace, a terrace-like remain of its own gravels and other alluvium cut into and abandoned by a river as it narrows and deepens its channel, each marking the level of a former flood-

the middle terrace, and the low-level gravels, the highest being the oldest. In Maine and elsewhere there are four, five, or even six or seven levels, as in the valley of the Connecticut, and the period to which they owe their formation, that immediately following the Glacial Period, has been termed the Terrace Period. Though there can be little doubt that the successive terraces indicate a shrinking of the volume of water in the rivers from the time when they were swollen with the melting snows of later Glacial times, they probably also indicate successive uplifts of the land, increasing the velocity, and consequently the scour, of the rivers, whilst raising their former flood-plains beyond reach of inundation.

Riviera, a name applied to the Mediterranean coast from Spezia in Italy westwards to Hyères in France. It is renowned for its scenery, winter climate, luxuriant and sub-tropical vegetation, and the remarkable coloration of sea and sky. From Spezia to Genoa the district is called Riviera di Levante and from Spezia to Hyères Riviera di Ponente. The principal places on the littoral are Spezia, Santa Margherita, Genoa, Savona, Porto Maurizio, San Remo, Bordighera, Ventimiglia, Mentone, Monaco, Villefranche, Nice, Antibes, Cannes, Fréjus and Hyères. The Corniche road follows the sea for a considerable distance. It is of interest to note that the term Riviera is a foreign appellation, never being used by the natives of the seaboard.



"IN MANUS TUAS, DOMINE."

(From the etching by C. O. Murray, after the painting by Briton Riviere, R.A. By permission of the Council of the Art Union of London.)

plain. In Europe there are commonly three types of such terraces, known as the high-level gravels,

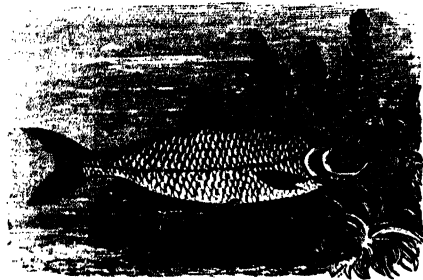
Riviere, BRITON, painter, was born in London on August 14th, 1840, and educated at Cheltenham

(where his father was drawing-master) and St. Mary Hall, Oxford. His bent towards art manifested itself while he was still a boy and he exhibited at the British Institution and Royal Academy when he was at Cheltenham and Oxford, his training being almost entirely due to his father. His subjects are mainly animal with the human figure introduced (often prominently) to aid the composition. As a variant to the familiar pictures of Sir Edwin Landseer, who painted mostly the more familiar domesticated animals as though he loved them, while Riviere affected lions, tigers, and other "wild" creatures, his paintings soon acquired great popularity. He was elected A.R.A. in 1878 and R.A. in 1881. Among his best-known works are "The Poacher's Nurse" (1866), "Circe" (1871), "Daniel" (1872), "Persepolis" (1878), "In Manus Tuas, Domine" (1879), "Miracle of the Swine" (1883), "Vre Victis" (1885), "Rizpah" (1886), "A Mighty Hunter before the Lord" (1891), "Phœbus Apollo" (1895), "St. George" (1900), "To the Hills" (1901), and "Aphrodite" (1902).

Rivoli, a town of the province of Turin, Piedmont, Italy, 8 miles W. of Turin. In the royal palace Victor Amadeus II. died a prisoner in 1732. The manufactures comprise silks, linens and woollens. Pop. (1900), 7,200.

Rivoli, a village in the province of Verona, Venetia, Italy, 12 miles N.W. of Verona. It is famous as the scene of Napoleon's victory over the Austrians on January 14th, 1797. Masséna derived his ducal title from the village and a celebrated street in Paris commemorates the battle.

Roach (*Leuciscus rutilus*), a fish of the Carp family, common all over Europe north of the Alps.



ROACH.

It is about a foot long, dull green above and lighter below; the fins, excepting the dorsal, are red. It is a gregarious fish, swimming in large schools. The eggs furnish food for the trout. At ordinary times the roach frequents holes in the beds of rivers. It is said that they are sometimes found in bays in the Baltic near the shore. The roach is in best condition for table in October, but is not much esteemed as an article of diet. Formerly the mistaken notion prevailed that this fish was exempt from the ills that its class is heir to, according to the old proverb, "as sound as a roach." They

were therefore considered the fishes of Saint Roch (after whom they were supposed to be named), the healer and patron-saint of the sick and stricken.

Roanne, a town of the department of Loire, France, on the left bank of the Loire, 50 miles N.N.W. of St. Étienne. It was the Roman station Rodomna and was pillaged by the barbarians in the 4th century. It is an important industrial centre, owing much of its consequence to its position in the Loire and Rhône coalfield. The manufactures comprise cottons, woollens, pottery, tiles, chemicals and paper, in addition to iron- and brass-founding, dyeing and engineering. The chief buildings are the Hôtel-de-ville, and the churches of St. Étienne and Notre Dame des Victoires, and there are ruins of a castle and 11th-century tower. Pop. (1901), 34,900.

Roaring, a symptom of disease in the horse. It usually occurs in association with mischief involving the laryngeal muscles, ordinarily of the left side. This results in a narrowing of the glottis, which gives rise to a singular inspiratory sound (readily detected by passers-by on the pavement) exhibited, as a rule, under exertion.

Roaring Forties, a name applied to that part of the Atlantic which lies between the degrees of 40 and 50 N. The epithet has reference to the stormy weather which is encountered here by ships going between Europe and North America. The appellation is also given by analogy to the corresponding region in the south latitude of the Pacific, Atlantic and Indian Oceans.

Robbery, the felonious and forcible taking from the person of another goods or money to any value by violence or putting him in fear. (1) The taking must be unlawful; (2) the value is immaterial; (3) it must be by force or previous putting in fear. The punishment prescribed by an Act of Victoria's reign (24 & 25 Vict., c. 96) is penal servitude for fourteen years or not less than five years, or imprisonment with or without hard labour and solitary confinement not exceeding two years. And if the robbery be not effected or proved, but the offender be convicted of an assault with intent to rob, such assault is also felony, and imprisonment to the same extent may be awarded, though in case of penal servitude the term is limited to five years.

Robbia, LUCA DELLA, sculptor, was born at Florence, Italy, in 1399 or 1400, and studied under Ser Giovanni, an eminent goldsmith. He abandoned the goldsmith's art, however, and turned to sculpture, and after working in bronze for some years he perceived the advantages of terra-cotta and introduced a new enamelled ware which now bears his name. The secret of its manufacture was confined to his family, and died out before the end of the 16th century. Excellent specimens of his work may be seen in the Victoria and Albert Museum, London. Amongst his finest works in Florence are the singing gallery which he executed for the cathedral between 1431 and 1440 (now in the Bargello Museum), the panels for the north side of the Campanile, two of the panels of the sacristy door

in the cathedral and the tomb of Benozzo Federighi, bishop of Fiesole. As an example of his skill in terra-cotta may be cited the tympanum of the Madonna and Angels in the Via dell' Agnolo, Florence, while the only extant specimens of his statuary are the Kneeling Angels in the canons' sacristy in the same city, in which nearly all the labour of his art-career was performed, and where he died in 1482.

Robert I. [BRUCE.]

Robert II., King of Scotland, first of the Stewart kings, son of Walter III., Steward of Scotland, and Marjory, daughter of Robert Bruce, was born on March 2nd, 1316. As a boy he was present at the battle of Halidon in 1333, and during the exile of his uncle, David II., was unwearied in his efforts to maintain his country's independence of England. He besieged Perth, which was held by the faction of Baliol, in 1338, and recovered Edinburgh Castle in 1341. In the same year David II. returned from France and assumed the reins of government, but lost his liberty in 1346 after the battle of Neville's Cross, in which Robert led the left wing of the Scots. During the period of the king's detention in England till his release in 1357, Robert was Regent of Scotland. The conspiracy to divert the succession to the throne (failing heirs male of David II.) from Robert to Edward III. of England, or his son Lionel, was rejected by the Parliament at Scone (1364), but in the meanwhile the king had imprisoned Robert as a measure of security. He was released in 1370 and peacefully succeeded David II. in 1371, being crowned at Scone on March 26th. His reign, however, was of secondary importance, and he took no part in the war with England, which was renewed in 1378 and continued at intervals till his death at Dundonald, in Ayrshire, on May 13th, 1390.

Robert III., King of Scotland, originally known as John, Earl of Carrick, eldest son of Robert II., was born in or about 1340 and was crowned at Scone on August 13th, 1390. His Christian name was changed, partly to continue the use of Robert in honour of Bruce and partly to avoid that of the detested Baliol. The kick of a horse disabled him from bodily exertion shortly before his accession and explains why his brother the Earl of Fife, and not he, had been named regent in 1389. It also largely accounts for the supremacy wielded by his brother, whom he created Duke of Albany (1398) and who was virtually king. On the death of the Duke of Rothesay, the heir apparent, who was believed to have been murdered in Falkland Palace (1402) by his uncle Albany, the latter at once assumed the regency. The king died at Rothesay (or possibly Dundonald) on April 4th, 1406. He was buried before the high altar in Paisley Abbey, where Queen Victoria erected a monument to his memory in 1888.

Roberts, DAVID, painter, was born at Stockbridge, Edinburgh, on October 24th, 1796. After serving his time to a house-painter and decorator, he became a scene-painter for travelling companies. In 1822 he was retained for this work in the Edin-

burgh Theatre Royal, leaving it soon afterwards first for Drury Lane and then Covent Garden in London. Holidays spent in Normandy inspired him with a love for the old picturesque interiors and exteriors, and he gradually gave up the theatre for the easel. In 1824 he became a member of the Society of British Artists, was elected A.R.A. in 1839 and R.A. in 1841. His pictures acquired so great a vogue during his lifetime that he also produced several lithographs of his works as well as illustrated volumes of studies in foreign lands, such as *Picturesque Sketches in Spain* (1837), *Sketches in the Holy Land and Syria* (1842) and *Italy, Classical, Historical and Picturesque* (1859). He died in London on November 25th, 1864. He had a fine feeling for architectural effect, was an excellent draughtsman and possessed unusual skill in composition, as was manifested in his interiors of churches in which high ecclesiastical functions were proceeding. In this respect his experiences in the theatre had not been thrown away.

Roberts, FREDERICK SLEIGH ROBERTS, EARL, field-marshal, was born at Cawnpore, India, on September 30th, 1832, and was educated at Eton,

Sandhurst and Addiscombe. He obtained a commission as lieutenant in the Bengal Artillery in 1851 and served throughout the Indian Mutiny with great distinction, gaining the Victoria Cross at Khudaganj (January 2nd, 1858), when, single-handed, he recaptured a standard from two sepoy and cut down another sepoy in the act of



FIELD-MARSHAL EARL ROBERTS.

(Photo: Lyd Sawyer, Maida Vale, W.)

killing a sowar, or trooper. After service in the Abyssinian campaign of 1867-8 and the Lushai expedition of 1871-2, he superintended the arrangements for the durbar at Delhi, when Queen Victoria was proclaimed Empress of India (January 1st, 1877). He was next engaged in the Afghan War, in which he won some of his hardest battles and accomplished many brilliant feats, of which none was more conspicuous than his famous march after the disastrous defeat of the British force at Mairwand on July 27th, 1880. Ordered to proceed at once to the relief of Kandahar, Roberts started from Kabul on August 9th and reached Kandahar on August 31st, covering 313 miles in twenty-two days. On the following day he fought and won the battle of Kandahar. For these services he received the thanks of Parliament and was created G.C.B. and baronet. In

1881 he was appointed to the command of the Madras Army, in 1885 Commander-in-Chief in India and in 1895 Commander of the Forces in Ireland. After the early disasters in the Boer War (including Colenso, where his only son fell), he was sent to the Cape as Commander-in-Chief, landing at Cape Town on January 10th, 1900. The sieges of Ladysmith and Kimberley were raised in February and on the 27th of the same month General Cronje and the western army surrendered at Paardeberg. Roberts entered Bloemfontein on March 13th, Mafeking was relieved on May 17th and Pretoria occupied on June 5th. For these services he was created Earl and K.G. and was awarded the thanks of Parliament and a grant of £100,000. At the War Office he resumed the duties of Commander-in-Chief until the abolition of the post in 1904. He is the author of *The Rise of Wellington* (1895) and *Forty-one Years in India* (1897) and an advocate of the institution of rifle clubs throughout the United Kingdom.

Robertson, FREDERICK WILLIAM, divine, was born in London on February 3rd, 1816, and was educated at Beverley, Tours, Edinburgh Academy and University and Brasenose College, Oxford. Ordained in 1840, he entered on his clerical career with characteristic fervour, his first curacy being at Winchester, but after a year's hard work he was obliged to go abroad to recruit his health. He was married on the Continent (1841) to a daughter of Sir G. W. Denys, and on his return became curate at Cheltenham, where he remained four years. During these years he read deeply, and all his writings are strongly tinged by his studies in theology, of which he may be considered an original exponent. His preaching was most impressive, and, though belonging to no party, his influence seemed to permeate all. He finally settled in Brighton in 1847, where his zealous labours exhausted his delicate constitution and he died on August 15th, 1853. During his last years he suffered agonies of mind and body. His highly poetical *Sermons* are widely read. In 1865 the Rev. Stopford Brooke published his *Life and Letters*, which went through several editions.

Robertson, THOMAS WILLIAM, dramatist, was born at Newark-on-Trent, England, on January 9th, 1829. As a boy he played the child parts in Wisbech and other towns of the Lincoln circuit, and when he was older painted scenery, wrote songs, adapted plays and became general utility youth to the company. On the break-up of the circuit he came to London in 1848, where he underwent a good deal of privation. His first piece, *A Night's Adventures*, was produced at the old Olympic in 1851, but he did not retire from the stage until about 1860. For the next few years he contributed to various periodicals in London, but his work was mostly in the nature of pot-boilers. With his play of *David Garrick*, produced by E. A. Sothern in the Haymarket in 1864, he made a very decided hit and never afterwards looked back. His other works, though somewhat slightly talked of as "drawing-room comedies," and also as the "teacup and saucer school,"

enjoyed for a generation a widespread vogue. The most successful of these were *Society* (1865), *Ours* (1866), *Caste* (1867), his *chef d'œuvre*, *Play* (1868), *School* (1869), and *M.P.* (1870). *Home*, an adaptation of Augier's *L'Avanturière*, also enjoyed public favour, to some extent because of Sothern's superb acting. He died in London on February 3rd, 1871. His sister, MADGE ROBERTSON (Mrs. W. H. Kendal), was born at Cleethorpes, Lincolnshire, on March 15th, 1849, and became one of the most accomplished actresses, alike in comedy and pathos, of the English stage.

Robertson, TOM, landscape painter, was born at Glasgow, Scotland, on June 25th, 1850. He was educated at the Glasgow School of Art and afterwards in Paris under Benjamin Constant. In 1889 he began to exhibit at the Royal Academy in London, but, as has been the experience of so many artists of original and independent genius, received scanty encouragement at the hands of that body; and it was not until the year 1904—when he sent his picture "En Écosse" to the Paris Salon, where it was given a place of honour on the line—that public recognition was accorded to the rare merits of his work. On this occasion—the first time that he had solicited the judgment of the Salon—his picture was purchased for the nation and hung in the Luxembourg. He has exhibited at the Expositions of Paris, Venice, Munich, Dresden, Berlin, Melbourne and elsewhere. In 1898 a beautiful example of his work, "Luna Sorgente," exhibited at Venice, was purchased by the King of Italy for his private collection. His picture of "The Golden Moon" was chosen as one of the group representing the British nation at the St. Louis Exhibition in 1904 and a similar honour was done to his picture of "Dewy Eve," selected to form one of the British collection at the New Zealand International Exhibition in 1906. In 1897 he went to Morocco, where, after many hardships and adventures, he penetrated to the Atlas Mountains. His work during this journey is remarkable for its wonderful rendering of the intensely brilliant light of Morocco and for the purity, brilliancy, and luminosity of its colour. On his return, these pictures were exhibited as a "one-man show" at the Fine Art Society, in London, in 1898, when they attracted general attention. They were also exhibited at the Société des Peintres Orientalistes Français in Paris by special invitation. His work is well known in most of the English Provincial and Scottish Exhibitions and a fine example, "The Peaks of Arran," is to be seen in the permanent collection at Dublin. Tom Robertson is one of the most distinguished members of the Royal Society of British Artists, which he joined in 1896 and at whose galleries in Suffolk Street he has constantly exhibited. His work, always remarkable for its subtle rendering of tone, colour, light and atmosphere, is noteworthy besides for its sincerity and thoroughness from beginning to end. His special aim is the reproduction of light, atmosphere and colour, and in the recording of those particular and most elusive effects he is a veritable master. Unlike the great French Impressionist painters of

light and atmosphere, he seeks entirely to subordinate the *technique* of the painting, with the result that his pictures give the observer the feeling of nature itself, and all evidences of paint are eliminated. His pictures, "Moonrise, St. Ives Bay," exhibited at the Paris Salon in 1906, and "The Lonely Mill" mark the highest advance in the art of landscape painting.

Robertson, WILLIAM, historian, was born at Borthwick, Midlothian, Scotland, on September 19th, 1721, and educated at Borthwick, Dalkeith and Edinburgh University. He entered the ministry, being presented, in 1743, with the living of Gladsmuir, in East Lothian, where he remained until 1756, when he was called to Lady Yester's Chapel in Edinburgh, though he did not officiate until June, 1758. He was known as an eloquent preacher, but devoted most of his time to the study of history, and in 1759 published his *History of Scotland*, a work of fine qualities, which has, however, been somewhat displaced as an authority by later research in quarters not available in Robertson's day. In 1761 he was translated to Old Greyfriars, Edinburgh, and in the following year became Principal of the University, with which he combined in 1763 the post of historiographer for Scotland. In 1769 he published his *History of Charles V.*, which acquired European fame, and in 1777 appeared his captivating *History of America*. He died in Edinburgh on June 11th, 1793.

Robespierre, MAXIMILIEN MARIE ISIDORE, revolutionist, was born at Arras, in the department of Pas-de-Calais, France, on May 6th, 1758, and was educated at Paris, and, like his father and



MAXIMILIEN ROBESPIERRE.

his grandfather before him, became a barrister. He was a very ambitious and vain man, and the dawn of the Revolution found him amongst its strongest supporters. He saw his opportunity and made the most of it; but for a long time, despite the rapid rise of even shallower men, he acted a merely subordinate part. By his violent speeches

and uncompromising action, however, he attained popularity, and took his seat in the National Convention opened after the vile massacres of September, 1792. The party known as the Girondists vehemently opposed his high-handed conduct and very early proclaimed his dangerous character and tyrannical disposition. On one historic occasion he challenged them to declare his tyranny, and Louvet, one of their number, immediately replied with a startling philippic, which staggered even his effrontery. He was given a week to prepare his defence and managed to get an acquittal. He in his turn denounced the Girondists, accusing them of sympathising with the unfortunate king, whom he savagely attacked. The Girondists weakly relaxed their good efforts, seeing that the inflamed mob was with Robespierre, and the king was executed in January, 1793. Having glutted the popular thirst for the moment, Robespierre became almost supreme, and was hailed as incorruptible. As head of the Committee of Public Safety, as it was called, he exercised his power without restriction, aided by Couthon and St. Just. Marie Antoinette was executed in October, 1793, and the leading Girondists were the next victims, though it must be admitted that Robespierre also sent some of his most savage followers to the scaffold. The worship of Reason was established in June, 1794, and on July 28th of the same year the arch-tyrant himself was guillotined, owing to the efforts of the friends of the Gironde. He presented a fearful spectacle, as his jaw had been smashed by a bullet, an injury either self-inflicted or received at the hands of a gendarme.

Robin, REDBREAST, or **ROBIN REDBREAST** (*Erythacus rubecula*), a well-known bird of the Warbler family, resident in Great Britain, breeding as far north as the Orkneys. It is found nearly all over Europe, in North-West Africa, and the neighbouring islands, and in winter migrates as far south as the Sahara and eastwards to Persia. It is rather less than six inches long, olive-brown above, reddish-orange on the breast, and greyish on the under parts. Robins are pugnacious in disposition and solitary in habit. They feed on insects, worms, and fruit, and in severe weather, when the supply fails, they fearlessly approach houses in search of scraps and crumbs. Many folk-tales are current as to the origin of the ruddy plumage on the breast.

Robin Hood, an outlaw immortalised in English song and story, is supposed to have lived in the reign of Richard I., Sherwood Forest, Nottinghamshire, being the scene of his chief exploits. The greatest doubt hangs over the story, and he is believed by the best antiquaries to have been a purely fabulous character. The conjecture most generally accredited is that the name was that of a mythical forest-elf who figured largely in English and Scottish folk-lore and, at a later date, was given by the ballad-mongers to any gallant outlaw who lived in the green wood, excelled as a bowman, flouted the upholders of the forestry laws and so drew popular sympathy. A tombstone, which used to be at Kirklees, Yorkshire, was said to

be his, and it records his death as having taken place in 1247, but it is now known to be a clumsy imposture. Tradition states that he was the rightful Earl of Huntingdon and that his name was Robert Fitzooth; that he never plundered any but the rich and gave the proceeds to the poor in most instances. He was famous in Scotland, and one Scottish historian terms him "the prince of thieves" and "the most gentle thief." His skill as an archer, and the frolics of his companions, Little John, Friar Tuck and Maid Marian, are the theme of many a ballad and song. A collection of these was made by the antiquary Joseph Ritson, and some will be found in Percy's *Reliques*.

Robinson, HENRY CRABB, diarist, was born at Bury St. Edmunds, Suffolk, England, on March 13th, 1775. He was educated privately and articled to a lawyer in Colchester, where he heard John Wesley preach one of his last sermons. In 1800 he went to the Continent, meeting Goethe and Schiller at Weimar. Settling at Jena, he attended the University and returned to England in 1805. He soon made the acquaintance of John Walter, *secundus*, who appointed him *The Times* correspondent at Altona, and in 1808 he went to the Peninsula as special correspondent for the same journal, thus becoming the first war correspondent of any newspaper. He returned to London after the battle of Corunna, entered the Middle Temple and was called to the bar in 1813. He had formed a resolution to retire when his yearly income amounted to £500 and accordingly he gave up practice in 1828, the two wisest acts he ever did, he said, being the joining and leaving of the bar. By now he was on terms of the closest intimacy with Lamb, Coleridge, Wordsworth, Southey and other men and women of light and leading and enjoyed their confidences to a remarkable degree. He was identified with many notable institutions and was the founder of the Athenaeum Club and University College, London. He was a most interesting talker and his breakfasts were as famous as those given by Samuel Rogers. He died in London, at the age of ninety-one, on February 5th, 1867. He left several manuscript volumes of Diaries, Letters, Journals, Reminiscences and Anecdotes, of which, in 1869, a selection was published as *The Diary, Reminiscences and Correspondence of H. Crabb Robinson*.

Robinson, MARY, actress, whose maiden name was Darby, was born at Bristol, England, on November 27th, 1758, and educated at a school kept by Hannah More's sisters and also at Chelsea and Battersea. In her sixteenth year she was inveigled into a secret marriage with Thomas Robinson, a solicitor's clerk, who had given himself out as the son and heir of a wealthy gentleman. Meanwhile she had been introduced to David Garrick, who encouraged her to go on the stage and superintended some rehearsals. She made her *début* at Drury Lane on December 10th, 1776, as "Juliet," and was received with applause. "Nobody has ever called her a great actress," writes John Fyvie in his sumptuous and sane book on *Comedy Queens of the Georgian Era*, "but she played certain parts with a winning gracefulness, and the public were

bewitched by the beauty of her face and figure." She had attracted the notice of the rich men about town and, from the style she kept up, must have accepted their favours. At a command performance of *The Winter's Tale* on December 3rd, 1778, one of the audience was the Prince of Wales, afterwards George IV., who was at once enamoured of her and diligently pursued her with letters addressed to "Perdita" and signed "Florizel." She held him at bay for a time to fan his flame, but a bond for £20,000, payable when he came of age, signed by the Prince and sealed with the Royal arms, brought about several interviews. When the Prince's ardour cooled the *liaison* had become a public scandal, and Mrs. Robinson made her last appearance on the stage on May 31st, 1780. But the payment of £5,000 and an annuity of £500 in discharge of the Prince's bond should have sufficed to maintain her in comfort. Her extravagant habits were not so easily thrown off, however, and she accepted the protection for sixteen years



MARY ROBINSON AS "PERDITA."

(From the drawing by Geo. Dance, R. A.).

of Colonel Tarneton. As a writer of sentimental verse and novels she contrived to catch the public eye, and it is certainly pathetic to learn that, at the age of twenty-six, rheumatic fever made her a helpless cripple, and she had to be carried to and from her carriage to the end of her days. She died in her cottage near Windsor on December 26th, 1800. Her portraits by Sir Joshua Reynolds, Thomas Gainsborough and George Romney have rendered familiar her beautiful features and person.

Rob Roy, ROBERT MACGREGOR or CAMPBELL, commonly called a Highland cateran, or freebooter, son of Donald MacGregor of Glengyle, his mother being a Campbell, was born in 1671. The Scots Parliament had, in 1662, outlawed the MacGregors and Rob Roy adopted the name of Campbell. Though the ban was afterwards removed, the clan was proscribed in 1693 for the part it played at the Revolution. In 1712 a charge of fraudulent bankruptcy was brought against him, his principal creditor being the Duke of Montrose. The charge does not seem to have been made out, but it embittered Rob Roy and drove him into various acts of lawlessness. He became a cattle-trader, and when the Pretender went into the field in 1715 joined his forces. At the close of the rebellion, the

Duke of Montrose, with whom he had come into collision, confiscated his lands, and henceforward



ROB ROY'S GRAVE, BALQUHIDDER.

(Photo : H. N. King, *Shepherd's Bush, W.*)

Rob Roy avenged himself as best he could by raiding. He spent some time in Newgate prison, London, and was on the point of being deported to Barbados when, along with Lord Ogilvie, he was pardoned (1727). For the rest of his life he seems to have conducted himself peaceably, if not decorously, and died at Balquhadder in Perthshire, on December 28th, 1734, being buried in the kirkyard on the beautiful braes. Sir Walter Scott's well-known novel of *Rob Roy* perpetuates the traditions surrounding the name.

Robson, FREDERICK, actor, whose real name was Thomas Robson Brownbill, was born at Margate, Kent, on February 22nd, 1822. Apprenticed in 1836 to a London copper-plate engraver for twelve months, he carried on business as a master-engraver, but his success as an amateur led him to take an engagement as a professional, and he appeared on the stage in 1844. After acting in the provinces he came to London and made a reputation at the Grecian Saloon in the City Road. It was not until he was engaged by William Farren at the Olympic, on March 28th, 1853, that his marvellous powers were revealed. Small, almost insignificant, there were moments in his burlesque of "Macbeth" and of "Shylock" when he conveyed the idea of the electrical effect of Edmund Kean's tragic intensity. By his swift transition from tumultuous passion to irresistible drollery he was recognised as the greatest comedian of his time. His pathos in domestic drama in parts such as "Sampson Burr" in *The Porter's Knot* and "Peter Probit" in *The Chimney Corner* was unequalled, while his singing of "Villikins and his Dinah," in the rôle of "Jem Baggs" in *The Wandering Min-*

strel, was the rage of the town. Among his other conspicuous successes were "Desmarests," the malicious old man in *Plot and Passion*; "Daddy Hardacre"; and as the hero in *The Yellow Dwarf*. In his later years the liberties he took with his audience were forgiven so great a favourite and when, through ill health, he was no longer able to act he remained lessee of the Olympic, a responsibility which he had undertaken in 1857, until his death, in London, on August 12th, 1864.

Roc, a fabulous bird of huge size and immense strength mentioned particularly in the story of Sindbad in the *Arabian Nights*. The Crusaders seem to have brought the legend, with some embellishments, from the East. The bird was said to be strong enough to raise an elephant in its talons, and the notion of it may have had its origin in some tradition of an antediluvian beast.

Rochdale, a town of Lancashire, England, on the Roch, 6 miles N. of Oldham. It is a place of considerable antiquity, the Castle Hill being probably the site of a Saxon fortress, while part of the valley below the hill bears the name of Kill Danes, from a tradition that the Danes were slaughtered in great numbers in a conflict at this spot in the 10th century. The town is well situated to carry on effectively its large trade, the Rochdale Canal placing it in communication with the Irish Sea *via* Manchester, and with the Calder and Hebble Navigation at Sowerby Bridge, near Halifax, and so with the North Sea. The principal buildings include St. Chad's Church, approached from Town Hall Square by a flight of 122 steps, a Perpendicular structure that replaced a church of the 12th century; the Grammar School, founded by Matthew Parker, Archbishop of Canterbury; the Technical School in the Gothic style; the Town Hall; the Central Hall; the Free Library; the Infirmary; the Roman Catholic Orphanage under the charge of the Brothers of Charity, and the Market Hall. John Collier, the Lancashire poet, better known as Tim Bobbin (d. 1786), was buried in St. Chad's churchyard. John Bright, the orator and statesman, who was born at Greenbank, Rochdale, was for many years one of the most enterprising of her cotton-spinners. The town is honourably distinguished in the history of Co-operation, for the celebrated Equitable Pioneers set in 1844 that example which has now been followed in every civilised country. The principal manufactures are those of woollens (established by Flemings in the reign of Edward III.), including baize, flannels, blankets and frieze, Government being a large consumer; but a thriving trade is also done in cottons, calicoes, velvet and silk plush, in addition to iron-founding and machine-making. Pop. (1901), 83,112.

Roche, SIR BOYLE, was born in Ireland in 1743. After a military career, during which he distinguished himself in the American War, he retired from the army and entered the Irish parliament. Being a steady supporter of the Government, he was granted a pension for his services, appointed chamberlain to the viceregal

court and created a baronet on November 30th, 1782. His handsome figure and graceful, ready wit fitted him for his office, but in delivering the speeches which others had written for him he ornamented them with qualities peculiarly his own. So he gained his reputation for perpetrating "bulls," but many of those credited to him are of doubtful authenticity. When the question of admitting Roman Catholics to the franchise was being agitated, a proposal obnoxious to the Government, Roche stated that they had relinquished any wish to take part in elections. Lord Kenmare and other leading Roman Catholics were absent from Dublin at the time, and when they denied this assertion Roche justified himself in inventing it. He was "authorised only by a knowledge of the sentiments of the persons in question." He thought they should "profess their attachment to the lawful powers": their disavowal was of less consequence since his manoeuvre had succeeded. Notwithstanding this propensity, in private life he was an honourable gentleman. He fought hard for the Union and protested his love for England and Ireland was so great "he would have the two sisters embrace like one brother." He died in Dublin on June 5th, 1807.

Rochefort, a seaport and naval arsenal, department of Charente-Inférieure, France, on the right bank of the Charente, 20 miles S.E. of La Rochelle and 7 miles from the Bay of Biscay. It has been strongly fortified since the 17th century. In 1777 it was made the seat of a convict settlement, which was suppressed in 1852. The more prominent buildings are the church of St. Louis, the marine museum, the marine hospital, the naval medical school, the hydrographic school and the arsenal. The industries comprise shipbuilding, iron-founding and manufactures connected with the arsenal. Pop. (1901), 31,613.

Rochefort-Luçay, VICTOR HENRI, MARQUIS DE, journalist and politician, was born in Paris on January 31st, 1831. He was educated at the Collège St. Louis and early in his career was a dramatist and art critic. In 1863 he was attached to the staff of the *Figaro*, but his caustic treatment of the Napoleonic régime led to his retirement. He founded *La Lanterne* in 1868, but this was soon suppressed and himself sentenced to imprisonment and a heavy fine. Rochefort retreated to Belgium. In 1869 he was elected to the Chamber of Deputies for one of the divisions of Paris and started *La Marseillaise*. It was in connection with this journal that Prince Pierre Bonaparte slew Victor Noir—the friend of de Fonvielle—and the paper was seized. Rochefort next supported the Commune in the *Mot d'Ordre* and was elected to the National Assembly (1871). He suspended the paper because he disapproved of the Communists' violence and left Paris. But he was arrested by the Government of Thiers and transported to New Caledonia in 1873. Next year he escaped and proceeded to Geneva by way of the United States and revived *La Lanterne*. In 1880, under a general amnesty, he returned to Paris, and founded *L'Intransigeant*. He was a mainstay of Boulanger's

fiasco and followed him to Belgium. After the death of "le brave général" Rochefort settled in London for several years, but went back to Paris in 1895 in virtue of a fresh amnesty. He took part in the hostility to Captain Dreyfus and ostentatiously sided with the Boers in their war against Great Britain. Despite gravest faults of temper, judgment and taste, Rochefort was a conspicuous example of the brilliance of the French journalist.

Rochefoucauld. [LA ROCHEFOUCAULD.]

Rochelle, a fortified seaport and capital of the department of Charente-Inférieure, France, on the Bay of Biscay, 95 miles N. by W. of Bordeaux. The roadstead is well protected by the islands of Ré and Oléron. In 1890 the new port of La Pallice, on the front, four miles to the south-west, was opened. The walls of La Rochelle were built by Vauban, while of the earlier fortifications the Tour St. Nicolas and the Tour de la Chaîne yet remain. The most notable features are the Porte de l'Horloge, the cathedral, the Hôtel de Ville, and the Palais de Justice. There are also a picture gallery, lyceum, botanic garden, schools of art and hydrography and a public library. Shipbuilding and the manufacture of cotton, glass, chemicals, stoneware and sugar are the principal industries, besides iron- and copper-founding, petroleum refining, distilling and the fisheries. La Rochelle was a stronghold of the Huguenots. In 1571 Theodore Beza presided over a Protestant synod held here. It withstood successfully the siege of the Catholic army after the Massacre of St. Bartholomew, but in 1628 was reduced by Richelieu after an eight months' siege. Réaumur, the inventor of the thermometer, Bonpland, the botanist, and Fromentin and Bouguereau, the painters, were natives. Pop. (1901), 23,600.

Rochelle Salt consists of the double sodium and potassium salt of tartaric acid. It is prepared by adding cream of tartar (acid potassium tartrate) to a hot solution of carbonate of soda. It crystallises with four molecules of water,

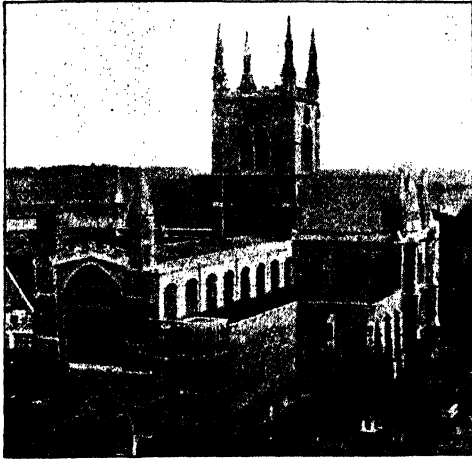


and forms prisms of the Rhombic system. It is readily soluble in water and is used commonly both in the chemical laboratory and in medicine.

Roches Moutonnées, rounded hummocks of live rock left exposed above the turf on slopes that have been formerly traversed by a glacier. Their rounded polished surfaces have not retained soil or seeds, so that they stand bare and conspicuous, like black sheep on the hillside, whence their name.

Rochester (the Roman *Durobrivæ* and Saxon *Hroffecastre*), a city of Kent, England, on the right bank of the Medway, 29 miles S.E. of London. It is connected with Strood by a bridge of three arches and the main street leads to Chatham. It has been several times pillaged and burned. Queen Elizabeth visited it in 1573. Charles II. slept here in 1660 in a building still called Restoration House, the Dutch in their foray up the Medway burned several ships off the city, and James II. embarked

here on the occasion of his flight in 1688, when he abdicated the throne. The old Black Bull Inn was popularised by Charles Dickens in *The Pickwick Papers* and the city is otherwise commemorated by the novelist, who died at Gadshill Place, a few miles distant on the road to Gravesend. The cathedral of St. Andrew, begun by Bishop Gundulf (1077-1108), occupies the site of the earlier church founded in 604, by Ethelbert of Kent, when the see



ROCHESTER CATHEDRAL.
(Photo : T. C. Heyworth.)

was founded. The building, consisting of choir, transepts, nave, aisles and central tower, is of several periods, but is especially noteworthy for the beautiful Norman west front. Other churches are St. Margaret's, rebuilt early in the 19th century in the Italian style, with a striking Perpendicular tower, and St. Nicholas', built in 1421, enlarged in 1624 and restored (after a fire) in 1892. Among secular buildings may be mentioned the Grammar School, founded by Henry VIII. ; the Guildhall ; the Corn Exchange, accommodating, besides the Assembly Rooms, the Free Library and Museum ; the County Court Offices ; Eastgate House, an Elizabethan structure referred to in *Edwin Drood* ; Fort Pitt, now a military hospital ; The Vines, marking the monks' vineyards ; the Poor Travellers' House, founded and endowed in 1579 by Richard Watts ; St. Catherine's Hospital and other charities. Of the Norman castle little remains save the magnificent keep, one of the very finest examples in the kingdom, 70 feet square and 104 feet high. The industries comprise cement works and shipbuilding, and a brisk traffic is carried on in coal, oysters and fruit. Pop. (1901), 30,622.

Rochester, capital of Monroe county, New York, United States, on both banks of the Genesee, 7 miles above its mouth in Lake Ontario, 70 miles E.N.E. of Buffalo. The three falls of the river

provide abundant water-power for the factories of the town. Of numerous parks the Genesee Valley and Seneca parks are the most picturesque. The Erie Canal is carried across the Genesee by means of an aqueduct, 848 feet long and 45 feet wide. The public buildings comprise the Court-house, City Hall, Chamber of Commerce, the University (Baptist), the Theological Seminary, Mechanics' Institute, Wagner Memorial College and the Reynolds and other libraries. The manufactures include clothing, boots and shoes, foundry and machine-shop products, tobacco, flour, agricultural implements, furniture and beer. A great trade is done in every branch of gathering. Pop. (1900), 162,608.

Rochester, JOHN WILMOT, 2ND EARL OF, poet, was born at Ditchley, in Oxfordshire, on April 10th, 1647, and educated at Burford School and Wadham College, Oxford, where he showed remarkable facility for verse. He succeeded to the title on his father's death in 1658. At the age of eighteen he saw some service at sea, but soon settled down to the shameless career of a dissolute courtier, becoming a boon companion of Charles II. and acquiring the unenviable reputation of being the most profligate of the Merry Monarch's associates. He told Bishop Burnet that he had been intoxicated for four years without break. His early death was the result of his debaucheries, but he became extremely repentant towards the close and Bishop Burnet, who seems to have effected this reformation, believed he would have been a very different man had he been spared. He died at Woodstock Park on July 26th, 1680. His poems, which are sometimes very witty, were collected and published in 1680. He had ordered them to be destroyed, on account of their licentious character, but his wishes were not carried out.

Rochet, a close-fitting surplice of lawn or lace now worn by bishops, and formerly by bishops, abbots, canons, and other ecclesiastical dignitaries. It reaches to the knees, and is either sleeveless or has close sleeves to the wrist. Sir Walter Scott in *Woodstock* speaks of a "red rochet" as worn by a layman.

Rockets are probably of all the forms of fireworks the most popular and most beautiful. In the details of their construction they may vary, but are all alike in their general form. They consist of a body, usually of stiff paper, which contains the composition to be fired. As this body is only open to the air by a small aperture below, the rapid out-rush of the gases produced by the firing causes the rocket to ascend rapidly, leaving behind it the stream of sparks. When the composition has burnt out, touch-paper ignited carries the combustion to the head of the rocket, usually conical, made of paper, and containing a quantity of fireworks, which are thus ignited and scattered as brilliant and fiery rain and other charming devices. Besides their use for firework displays, rockets are largely employed in signalling in war, at sea, and for life-saving apparatus. By far the greater quantity of rockets manufactured are indeed used for this

purpose. The firework head is in this case omitted; otherwise their form is essentially similar. The rocket is attached to a rope and is fired from the land over the masts or rigging of the wrecked ship, and this rope then affords the means of fixing between the vessel and the shore a thicker rope, and the basket, "breeches buoy," etc., by which the sailors can be brought to land. The Congreve rocket, so named from its inventor, Sir William Congreve (1772-1828), was a shell of sheet-iron that carried a charge of canister shot, bullets and other missiles. The composition used was saltpetre, sulphur and charcoal and the rockets sometimes had a metal head loaded with a bursting charge that might prove very destructive. Invented in 1808, they were used with considerable effect at the battle of Leipzig in 1813; rather, however, as productive of confusion and alarm and consequent demoralisation than as actively damaging. Modern improvements in ordnance have displaced them as weapons of attack, and in warfare they are now mostly employed for signalling purposes.

Rockhampton, a town of Queensland, Australia, on the right bank of the Fitzroy, 43 miles from its mouth and 335 miles N.N.W. of Brisbane. The chief buildings are the Government Offices, School of Art and Town Hall. It is the outlet of a large agricultural tract and gold and manganese are found in the adjoining region. Pop. (1901), 15,461.

Rockingham, CHARLES WATSON WENTWORTH, 2ND MARQUIS OF, was born on May 13th, 1730, and was educated at Westminster School and St. John's College, Cambridge. He succeeded his father in 1750 and entered the House of Lords, where he obtained the reputation of being a wise and moderate statesman. Attaching himself to the Whig party, he became First Lord of the Treasury in 1766, after Pitt's refusal to accept the office. His Government was not a very brilliant one, and his introduction of Edmund Burke into Parliament is his most notable service. He was above all an honest statesman, and strongly objected to the action which led to the loss of the American colonies, thereby earning the hatred of George III. In 1782 he was again Prime Minister, but died three months (July 1st) after his accession to power.

Rocking-stone, or LOGGAN, a huge boulder that has weathered in such a way as to rest on the rock or other platform on which it is superimposed as on a pivot or point of balance. "These rounded boulders," writes Dr. Robert Brown, "though weighing many tons, are so finely poised as to sway backwards and forwards on the slightest impulse. Though it is quite possible that some of them may be artificial, yet, as they occur in nearly every country and always in the same position, it is all but certain that in the majority of instances they are natural. They may have originated in a tor-like mass (Cornish), or in a series of cuboidal blocks, such as may be seen in the Mittagstein in the Riesengebirge, where the granite has weathered along the joints. Then the felspar and other decomposable ingredients being washed away by the

rain, what was originally a solid pillar becomes, by a gradual process of decay, either a heap of spheroidal masses piled one upon the other, or a single boulder resting on the more massive rock below. In most cases the equilibrium of these piled-up boulders is not retained. The base crumbles and they tumble down. But should a mass so crumble away that in spite of the gradual diminution of its point of support the balance is kept, a rocking-stone is the result. A superstitious feeling attaches to many of them, and having been used either as sepulchral monuments (as in Greece) or as means of divination—the number of vibrations determining the answer to be given by the oracle—the idea has arisen that all of them were artificial. The great loggan of Land's End, in Cornwall, has been estimated to weigh more than 90 tons. This, like a similar one, the 'Buckstone' in Monmouthshire, was overturned by some mischievous idlers, but was eventually replaced at an immense cost of

time, money and labour. One situated at Island Magee, on Brown Bay, in Ireland, is by the superstitious people in the neighbourhood believed to acquire a rocking, tremulous motion at the approach of malefactors and other heinous sinners. Finally



ROCKING-STONE.

it may be added that when granite weathers in such a manner as to leave boulder-shaped masses on the summit of a hill, these collections of rocks are known in Germany as a 'Felsenmeer,' or 'Sea of Rocks.' Such a one occurs at Felsberg, in the Odenwald."

Rockling, a fish belonging to the genus *Motella* of the Cod family. It is widely distributed in European waters and occurs also off Iceland and Greenland. Five species are British. The five-bearded Rockling (*Motella mustela*) has a barbel on the chin, two barbels on the upper lip near the point of the nose, and two longer ones a little farther back. The upper part of the body is dark brown, but the sides become lighter and the ventral fins and belly are white. It seldom exceeds nine or ten inches in length. It feeds on young fishes and thin-shelled crustaceans. The three-bearded Rockling has barbels only on the upper lip. In stormy weather it is sometimes cast ashore entangled in seaweed. Like the five-bearded species it lurks beneath stones and does not take the hook. Since its flesh acquires an unpleasant odour soon after it is caught, it is not used for food. It reaches a length of 17 inches. The four-bearded Rockling (*Motella cimbria*) has a barbel on each nostril, a third on the middle of the snout, and the fourth on the chin.

Rock-Oil. [PETROLEUM.]

Rocks are solids occurring in considerable masses in the earth's crust. They exhibit great variety in chemical and mineral composition, in texture, and in general structure, which suggest differences in their mode of origin. Some rocks are almost exclusively composed of silica, silicates and a few other substances that would withstand a very high temperature without volatilisation or even fusion; whilst others are largely carbonaceous or calcareous and, therefore, would readily be destroyed by heat. Some rocks again are made up of irregular, broken or rounded fragments, others of crystals, and others of glass or of crystals in a glassy magma or ground-mass. Those of crystalline texture may be composed of one mineral, or of several, and in the latter case the minerals may be confused together or arranged in alternating layers (foliated). In general structure rocks may be stratified, or arranged in strata, or layers, or massive, or unstratified; and these last may occur thrust through others in branching veins, in wall-like dykes, in broad horizontal sheets, in rounded bosses or in huge mushroom-shaped masses or laccolites. The primary divisions of the classification of rocks most generally employed are based upon their mode of origin as inferred from composition, texture, structure, and mode of occurrence. As the chief groups and individual species of rocks are noticed separately, it will suffice here to give a tabular grouping that will be self-explanatory:—

AQUEOUS ROCKS.**MECHANICALLY FORMED.****Psammitic (mainly silicious):—**

<i>Loosely aggregated.</i>	<i>Compact.</i>
Gravel.	Breccia.
Shingle.	Conglomerate.
Grit.	Griststone.
Sand.	Sandstone.
	Greywacke.

Pelitic (mainly argillaceous):—

Clays.	Loess.
Mudstone.	Loam.
Shale.	Marl.
Fuller's-earth.	Marlstone.

ORGANICALLY FORMED.**Calcareous (mostly animal):—**

Limestones.
Chalk.
Shell-marl.

Phosphatic (animal):—

Bone-beds.
Nodular or coprolite beds.

Silicious:—

Flint.
Chert.
Tripoli.

Carbonaceous:—

Peat.	Coals.
Lignite.	Anthracite.
Jet.	Bitumens, oil-shales, and asphalts.

CHEMICALLY FORMED.**Calcareous:—**

Stalactite and Stalagmite.
Travertine.

Oolite and Pisolite.
Cement-stone.
Dolomite (compact).

Gypsum.
Rock-salt.

Ferruginous:—

Hæmatite.
Bog-iron-ore.
Clay-ironstone.
Geyerite.

VOLCANICALLY FORMED.

Tuff.

IGNEOUS ROCKS.**Acid:—**

<i>Crystalline.</i>	<i>Glassy.</i>
Granite.	Obsidian.
Eurite.	Pitchstone.
Felsite.	Perlite.
Liparite.	Pumice.

Intermediate:—

<i>Plutonic.</i>	<i>Volcanic.</i>
Syenite.	Trachyte.
Diorite.	Andesite.
	Phonolite.

Basic:—

Basalts.
Diorase.
Gabbro.

Ultra-basic:—

Peridotites.

METAMORPHIC ROCKS.

Slate.	Saccharoid Marbles.
Schists.	Dolomite (cavernous).
Gneiss.	Opheicalcite.
Amphibolites.	Serpentinite.
Quartzite.	Graphite.

Rock-Salt, the mineral form of common salt (NaCl), crystallises in cubes, often hollow, varies greatly in colour from slight impurities, being most commonly ochreous, and has a hardness of 2 to 2.5 and a specific gravity a little over 2. It is, of course, soluble, with a characteristically saline taste. It occurs as a volcanic sublimate and as an efflorescence in rainless regions of Africa and Chile; but chiefly in beds associated with gypsum, as the result of the evaporation of inland waters, as at Wieliczka in Austrian Galicia and in the Triassic rocks of Droitwich in Worcestershire, Middlesbrough in Yorkshire, and various parts of Cheshire.

Rock-Slaters, a group of Isopoda belonging to the genus *Ligia* and abundant in rock-pools around the English coast. The Giant Sea-Slater (*Ligia oceanica*) runs with great agility and, when attacked, folds itself up and feigns death.

Rocky Mountain Goat (*Haplocerus montanus*), or MAZAMA, an aberrant American antelope, with small, short, backward-directed horns, which is not properly a goat at all. The long, abundant, fleecy hair is yellowish-white and in general appearance the animal is not unlike a diminutive albino bison, though its aspect suggests still more forcibly that of a chamois with a fleecy coat, thus resembling the goat of Angora or Cashmere. It occurs in the mountainous country in the north-west of the United States and adjoining tracts of Canada.

The flesh is uneatable, from its strong musky smell, which is due to the musk-glands behind the horns.

Rocky Mountain Sheep (*Ovis montana*), or **BIGHORN**, the latter name referring to the immense size of the horns, which though shorter, stouter and not so spiral, recall those of the Argali, of which it is the representative in the western United States. It is a gregarious, stoutly-built creature, standing 40 inches at the shoulder, and greyish-brown in colour, with a patch of white on the buttocks. It occupies the higher mountain ranges from New Mexico and California northwards, coming down nearly to the sea in higher latitudes, and being plentiful in parts of Colorado, Wyoming, Montana and Idaho. It is hunted for its excellent mutton.

Rocky Mountains, THE, or **ROCKIES**, the name sometimes applied to the mountains of the western half of North America, but strictly denoting the eastern border of the region. They extend from New Mexico to the Arctic Sea, and end to the west of the Mackenzie river. In Wyoming a region of elevated plateaus divides the range into two parts. The chief groups of the southern portion form the Colorado Range, rising to a height of 9,000 feet in Wyoming and crossed at a height of 8,000 feet by the Union Pacific Railway. In Colorado the average height is 13,000 feet, rising in Gray's Peak to 14,341, Long's Peak 14,271, Pike's Peak 14,147. The Sawatch Range south of Arkansas River has Mount Harvard (14,375 feet), with passes at a height of from 12,000 to 13,000 feet. The Parks of Colorado, North, Middle, South, and that of St. Luis, are from 6,000 to 10,000 feet high, and surrounded by ranges three or four thousand feet higher. On the western border of St. Luis Park is San Juan Range, with several peaks over 14,000 feet high, and very many more over 13,000 feet. The Sangre di Cristo Range to the north-east of the Park has Blanca Peak (14,464); the Uintah Range, west of the Park, has several points over 13,000 feet, and the Wahsatch Range, which is the western limit of the Southern Rocky Mountains, rises to 12,000 feet, east of Salt Lake City. The northern division is less lofty and imposing except in the Yellowstone region and the Windrush Range. In Idaho and Montana greater irregularity occurs, and the Bitter Root Mountains forming the divide between the Columbia and Missouri have a height of 9,000 feet, with passes ranging from 5,000 to 6,000 feet. The North Pacific Railway crosses at 5,548 feet with a tunnel over 1,000 yards long. The Crazy Mountains north of the Yellowstone rise to 11,000 feet, and Mount Harvey in the Black Hills is 9,700. In Canada Mount Brown is 16,000 feet, and Mount Hooker 15,650, while the general height ranges to 14,000 feet. Athabasca Portage between these peaks crosses at a height of 7,300 feet. Of the rivers rising in the system the Mackenzie flows to the Arctic Sea, the Saskatchewan to Hudson Bay, the St. Lawrence and Missouri to the Atlantic, and the Colorado and Columbia to the Pacific. The scenery of the Rocky Mountains is of savage grandeur; the wild animals are plentiful and formidable (including the grizzly bear, bighorn sheep, pronghorn, caribou, puma and gopher); the

forest growth in parts is magnificent, and there is great mineral wealth, chiefly in gold, silver, copper and iron.

Bococo, a debased form of Louis Quatorze ornamentation, consisting of scroll-work of fantastic formation, without unity of design or purpose, but presenting in the most elaborate examples a certain tawdry magnificence. The term is also frequently applied to literary work of a somewhat ornate but pretentious and meaningless character.

Rodents (*Rodentia* = "gnawing animals"), a well-defined order of Mammals, more widely distributed and containing a greater number of species than any other, and easily recognised by their large chisel-shaped incisor teeth and the absence of canines. But on this account, in spite of their vast numbers and the great variety of forms they exhibit, they are the most homogeneous of all the mammalian orders. All of them gnaw their food; nearly all are vegetable-feeders, but mice and rats are omnivorous. Most of them are adapted for life on the ground, but some are arboreal, others burrow, and a few are aquatic. None of the order attains to any considerable size, the largest being as big as a small pig, while the rat or squirrel may be taken as showing the average dimensions. Nor are the Rodents remarkable in point of intelligence. The brain is comparatively small and the cerebral hemispheres show no traces of those convolutions of the surface so characteristic of most mammals. The sense organs are usually well developed and the eyes and external ears are often large. The body generally is plump and short, and the head is borne upon a short neck. In some cases the four legs are of moderate length, or the hind legs may be enormously developed to form powerful leaping instruments, but, as a rule, the limbs are short, so that the belly is close to the ground. There are two sub-orders—

(1) Simple-toothed Rodents (*Simplicidentata*), with two upper incisors, and (2) Double-toothed Rodents (*Duplicidentata*), with a second pair of small size immediately behind the functional incisors of the upper jaw. The squirrel, beaver, rat, mouse, jerboa, porcupine, chinchilla, agouti, paca and cavy belong to the first, and the hare and rabbit to the second, group. Most of the families are represented by fossil remains, the earliest appearing in Eocene deposits. In the majority of cases these remains occur in regions frequented by their living descendants. One fossil South American type, however, has proved a puzzle to palaeontologists. Its scanty remains were found in the Pliocene of the pampas of La Plata. "What distinguishes it at once," writes W. S. Dallas, "from all other Rodentia is the presence, in the lower jaw, of four incisor teeth, the second pair being very small and placed immediately behind the outer edge of the broad middle pair. The latter are peculiarly widened and compressed from front to back in both jaws, and their summits, instead of being worn to a sharp chisel-like edge as in ordinary Rodents, show an elongated ring of enamel surrounding a slightly depressed surface." In consequence of the presence of this feature Alston established a third sub-order for the type, which

he denominated the Blunt-toothed Rodents (*Hebidentata*). The species, of which Bravard was the discoverer, was named *Mesotherium cristatum*. What further complicates its exact allocation is that it offers resemblances to some aberrant Ungulates and also to the Edentates. It has therefore been surmised that it was a survivor into Pliocene times of a type that represented an era in which the Rodents were not yet clearly marked off from their allies.

Roderick, the last Visigoth King of Spain, obtained the throne in the year 709, having managed to depose the King Witiza. His reign did not last long, however, for the two sons of the dethroned king, securing help from Tarik, the Moorish governor of Africa, ravaged Andalusia, and finally met him in battle in 711 at Xeres, where Roderick, who was at the head of 90,000 Goths, was slain and his army put to flight. This is the accepted version of the fate of the Last of the Goths, but there are other traditions concerning his career after the battle. According to one, he retired to Merida and there rallied his forces, but was compelled to give battle, two years later, in the province of Salamanca and was then slain. Another legend has it that he ended his days in retirement at Visco in Portugal, while a third declared he had been buried alive and devoured by serpents. In any case with his overthrow ended the Gothic and began the Moorish dominion over Spain. Roderick's exploits formed the subject of poems by Sir Walter Scott and Robert Southey.

Rodez, capital of the department of Aveyron, France, 85 miles N.W. of Montpellier. It is a picturesque, old-fashioned town of narrow winding streets and pleasantly situated on a hill overlooking the Aveyron. The principal buildings are the Cathedral of Notre Dame with a unique clock tower, 260 feet high, surmounted by a colossal statue of the Virgin; the Church of St. Amans of the 11th and 12th centuries; the Bishop's Palace; the Renaissance Hôtel d'Armagnac with fine bas-reliefs and the Maison des Anglais. There are remains of a Roman amphitheatre and aqueduct. The manufactures include textiles, besides iron- and copper-founding, dyeing, brewing and quarrying. Pop. (1901), 16,000.

Rod-Fishing, fishing with a rod and line, fly-fishing; it may be indulged in all the year round, though there are various close seasons for different kinds of fish.

Rodin, AUGUSTE, sculptor, was born at Paris in 1840. He studied Barye without being influenced by him, and acquired by a thorough, if slow, practical apprenticeship a *technique* of remarkable originality. Compelled by necessity to earn a living, he

worked from 1864 to 1870 as assistant in the studio of the sculptor Carrier-Belleuse where, although he gained no artistic benefit, he acquired not only considerable skill as a modeller, but a knowledge of the difficulties and limitations of his materials and *métier* which afterwards stood him in good stead. After the Franco-German war, finding work scarce in Paris, he migrated to Brussels, where he collaborated with the Belgian artist, Van Rasbourg, in the production of exterior sculptures and interior caryatides for the ornamentation of the Bourse. He worked in Brussels from 1871 to 1877. In 1874 he exhibited the "Man with the Broken Nose," which, crude though it was, showed his turn for realism and strong expression. On his return from



VICTOR HUGO.
(By Auguste Rodin.)

Brussels in 1877, complete master of his *technique* he sent the "Age d'Airain" to the Salon. The reality of the modelling of this statue and its absolute truth to nature so impressed the jury that many of their number were of opinion that it had been cast from the life, and it was only after long inquiry that justice was finally rendered to the artist. In 1880 he once more sent the "Age d'Airain" to the Salon, where it received a third-class medal and was purchased by the State for the Luxembourg Gardens in Paris. In the 1882 Salon he exhibited "St. John the Baptist"—a replica of which may be seen in the Victoria and Albert Museum at South Kensington—and "The Creation of Man." From 1882 to 1885 he exhibited busts of Jean Paul Laurens, Carrier-Belleuse, Victor Hugo, Dalou, and Antonin Proust. During this period he also produced busts of W. E. Henley and Alphonse Legros, a statue representing "Bellona," and an equestrian portrait of General Lynch. In 1882 he began his great decorative scheme, "La Porte de l'Enfer" which the State acquired for the Museum of Decorative Arts in Paris. The period from 1886 to 1890 was one of pronounced activity.

Among other things he exhibited a small version of "Le Baiser"; to this interval belongs the famous gigantic group of "The Burgurers of Calais," which was exhibited in 1889. He also created many imaginative figures at this time, the most notable being "La Danaïde," "La Pensée," "Celle qui fut Heaulmière" (also called "La Vieille Heaulmière"). For the town of Damvilliers he modelled a bust of the painter Bastien-Lepage, and for Nancy one of Claude Lorrain. In 1890, together with a number of artists whose independent and original genius refused to be confined by the traditional conventions of an effete academic art, he left the Société des Artistes Français to join the new Société des Beaux Arts. In 1892 he exhibited "La Cariatide" and a sketch in plaster of a monument to Victor Hugo, as well as a figure of President Sarmiento for the Argentine Republic. In 1898 he exhibited his famous statue of Balzac—a work both original and unique, in which he sought to express the soul and atmosphere of that immortal genius. This statue gave rise to much controversy and was rejected by the Society of Men of Letters by whom it had been commissioned. This was not the only insult offered to Rodin, for, at a later date, the civic authorities of Paris ordered a bust of Victor Hugo to be set up in the Place Royale. He produced the bust, but when a photograph of it was sent to the Hôtel de Ville, he instantly received an official letter requesting him to consider the commission cancelled. In the same year he exhibited a large marble group of "Le Baiser," representing Paolo and Francesca, which was bought by the State. In 1899 "Eve" and busts of the sculptor Falguière and Henri Rochefort were exhibited. In 1900, during the International Exhibition, the city of Paris conceded a pavilion to Rodin for a complete exhibition of his *œuvre*. Many fine examples of his sculpture may be seen in the Luxembourg Gallery. These include the "Age d'Airain," "Le Baiser," "St. John the Baptist," "Danaïde," "La Vieille Heaulmière," "La Pensée," and busts of Madame M. V., Jean Paul Laurens and Puvis de Chavannes. Rodin has also exhibited many interesting etchings and drawings of marked originality and expression. He succeeded J. M. Whistler as President of the International Society of Sculptors, Painters and Gravers. Of Rodin's art Arthur Symonds says noutely, in an essay in his volume entitled *Studies in Seven Arts* (London: Constable), it "competes with Nature rather than with the art of other sculptors. Other sculptors turn life into sculpture, he turns sculpture into life. His clay is part of the substance of the earth, and the earth still clings about it as it comes up and lives. It is at once the flower and the root; that of others is the flower only, and the plucked flower. That link with the earth, which we find in the unheaven masses of rock from which his first creations of pure form can never quite free themselves, is the secret of his deepest force. It links his creations to Nature's, in a single fashion of growth."

Rodney, GEORGE BRYDGES RODNEY, BARON, admiral, was born at Walton-on-Thames, England, in 1719, and educated privately and at Harrow.

He entered the navy at an early age, and in 1742 was promoted captain, and in the next few years was employed in coasting for the protection of trade. After the peace of 1748 he was appointed to the *Rainbow* as governor of Newfoundland. He returned home in 1753 and married the sister of the Earl of Northampton, and in 1759 became admiral of the blue. In the same year he bombarded Havre de Grâce and destroyed the stores which had been got together for the purpose of an invasion of England. He reduced Martinique in 1762 and also seized St. Lucia, Grenada and St. Vincent, being promoted vice-admiral later in the year. Next year he returned home and was created a baronet. He became M.P. for Saltash in 1751, and in 1768 was elected member for Northampton, but the expense was so ruinous that he was obliged to retreat to France for a time. Promoted admiral in 1778 he was appointed in the following year to the command of the Leeward Islands station and, on his way out, encountered the Spanish fleet to the south of Cape St. Vincent on January 16th, 1780. He gave immediate chase, fought it in the darkness of night whilst a tempest was raging, and utterly defeated it. During the Dutch war he captured (1781) the island of St. Eustatius and merchandise to the value of nearly £3,000,000, but the island was shortly afterwards retaken by the French, who also succeeded in seizing the convoy accompanying the prizes to England. On April 12th, 1782, he engaged the French fleet under De Grasse in the West Indies and thoroughly vanquished it, a victory that might have been made still more complete had he given chase in the night. This success procured him the thanks of both Houses of Parliament, a pension of £2,000 a year and a peerage. He was done now with active service, and died in London on May 23rd, 1792.

Rodrigues, an island in the Indian Ocean, one of the Mascarene group, situated in 19° 41' S. and 63° 23' E. It covers an area of 43 square miles. The surface is rugged, the Grande Montagne ridge (1,140 feet) running throughout the island from east to west. The soil is fertile, yielding tropical fruits, maize, millet, rice and manioc. The island is specially interesting as the home of the solitaire, a great bird which became extinct towards the close of the 17th century. The Portuguese discovered Rodrigues in 1645, and it has belonged to Great Britain and has been governed as a dependency of Mauritius since 1814. Port Mathurin is the principal harbour. Pop. (1901), 3,162.

Roe, or ROEBUCK (*Capreolus caprea*), a small deer, native to Europe and Western Asia below the line of perpetual snow, formerly common in Wales and on both sides of the Cheviots, though few are now to be found south of Perthshire, in consequence of the demolition of forests. The male stands a little over two feet at the withers, has a reddish-brown coat in summer, turning grey in winter, and antlers consisting of a rough bifurcated beam, the hinder branch of which is again forked, all the points being sharp and capable of inflicting a serious wound. Roe-deer do not herd, a buck and roe with their fawns keeping together, their favourite haunts

being the dense underwood of forests. They are of a wild, shy and cautious disposition, and feed largely on the tender shoots of young trees, and do considerable damage to woods and plantations. The venison is less esteemed than that of the fallow deer, and the antlers are used for the handles of knives and forks, of walking-sticks and umbrellas and for other articles.

Roebuck, JOHN ARTHUR, politician, was born in Madras, 1801. On the death of his father Ebenezer Roebuck, his mother remarried and they went to Canada, where he was educated. Coming to England in 1824 he was entered at the Inner Temple and called to the bar in 1831. Becoming the friend of Bentham and John Stuart Mill and other leading reformers, he was elected M.P. for Bath in the first reformed parliament (1832). In his maiden speech he declared himself "an independent member" and he maintained an attitude of hostility to whatever Government was in power to the close of his life. Attacking all who differed from him, his vehemence earned him the nickname of "Tear 'em." He lost no opportunity of showing his contempt for the Whigs: "When out of office they are demagogues; in power they become exclusive oligarchs." He appeared at the bar of the Commons on behalf of the Canadian Assembly to protest against the suspension of the Canadian Constitution and the motion which he carried for an inquiry into the conduct of the Crimean War, on January 26th, 1855, caused the fall of the Aberdeen ministry. Roebuck during the Civil War in the United States of America championed the slaveholders of the South; he defended Austrian rule in Italy and supported the Earl of Beaconsfield during the Eastern Crisis of 1877-8. He died on November 30th, 1879, regarded as an impracticable politician, but respected as a disinterested man.

Roeskilde, or ROSKILDE, a seaport of the island of Sealand, Denmark, at the head of the Roeskilde Fjord, 19 miles W. by S. of Copenhagen. Founded at the close of the 10th century and till 1443 the capital of the kingdom, the rise of Copenhagen and frequent visitations of pestilence and fire effected its decay. The 11th-century cathedral contains the tombs of most of the Danish kings. Pop. (1901), 8,300.

Rogation Days, the Monday, Tuesday, and Wednesday before Ascension Day (Holy Thursday, the fortieth day after Good Friday). The custom of observing these days with special rites was introduced by Mamertus, Bishop of Vienne, in the South of France, about 470, when humiliation was proclaimed in consequence of the prevalence of calamities (earthquake, floods, volcanic eruptions and other catastrophes). Spreading throughout France it at length extended to England. In the Roman Catholic Church the Litany of the Saints is said in procession on these days, and in the English Church, the days being set aside as days of fasting, it is customary to say the Litany and to read the homily. Ascension Day was that appointed for the curious secular practice of beating the bounds of a parish or riding the marches.

Roger I., Count of Sicily, son of Tancred de Hauteville, was born in Normandy in 1031. In 1058 he assisted his brother Robert Guiscard to reduce Calabria and two years later proceeded to Sicily to free it from the Saracen dominion. In this enterprise he was successful, capturing Palermo in 1071, when his brother created him Count of the island. On Robert's death in 1085 Roger succeeded to his territories in South Italy, and when he had entirely conquered Sicily (1090) he was the virtual head of the Norman supremacy in southern Europe, Pope Urban II. finding it to his interest to strengthen his rule by the grant of ecclesiastical privileges. He died at Mileto in Calabria in 1101.

Roger II., King of Sicily, son of the preceding, was born about 1093. In 1127 he claimed the duchy on the death of his kinsman Duke William of Apulia, who left no issue, and after some opposition had his claim allowed. Pope Honorius excommunicated him without effect, and did not recognise him till a year had elapsed. In 1130 Roger gave himself the title of king, and was opposed this time by Innocent II., the successor of Honorius. He was, nevertheless, crowned in Palermo cathedral, and nine years later the Papacy acknowledged his sovereignty. He enlarged his kingdom by the incorporation of Capua in 1136, Naples in 1138 and the Abruzzi in 1140. For a time he adopted the singular style of "King of Sicily and Italy." He carried conquest to various countries on the Mediterranean littoral, capturing Corfu and several posts in Africa. By deporting silk workers from Thebes and Peloponnesus he was instrumental in introducing the manufacture of silk into Sicily. Although the scourge of Greek and Saracen alike, at home he ruled wisely. He died in 1154.

Rogers, JAMES EDWIN THOROLD, political economist, was born at West Meon, Hampshire, England, in 1823, and educated at King's College School, London, and Magdalen Hall, Oxford. He took holy orders, but ceased to take service after 1860, resigning his orders ten years later. In 1862 he became Drummond Professor of Political Economy at Oxford, an office then held only for terms of five years. In 1867 he was defeated on seeking re-election, partly on political grounds. In 1874 he tried to enter Parliament, but without success, but represented Southwark from 1880 to 1885 and Bermondsey for over a year, losing the seat in consequence of his support of Home Rule. In 1888 he was reappointed to the Drummond Professorship and died in Oxford on October 12th, 1890. His economic investigations were of great value and his *A History of Agriculture and Prices in England* (1866, etc.) and *Six Centuries of Work and Wages* (1884) must take permanent rank amongst the classics of the science. He was a clear, vigorous and caustic speaker.

Rogers, JOHN, martyr, was born at Deritend, Warwickshire, England, about 1500, and educated at Pembroke Hall, Cambridge. He took holy orders and proceeded in 1534 to Antwerp, where he officiated as chaplain to the English merchants.

Here his friendship with William Tindal, the translator of the Old Testament, led him to abandon the doctrines of Rome and after his marriage (1537) he removed to Wittenberg to minister to a Protestant congregation. At this period he was engaged in seeing through the press the edition (mostly Tindal's and Coverdale's) of the English Bible which purported to be translated by "Thomas Matthew" (1537), to which he contributed some prefatory matter and marginal notes. It is supposed that he used the style of "Thomas Matthew" to escape Tindal's cruel fate and his Bible is commonly known as "Matthew's Bible." Returning to London in 1548, where he soon obtained preferment, he became vicar of St. Sepulchre's in 1550 and prebendary of St. Pancras next year. On the accession of Queen Mary his preaching was at once put under a ban and shortly afterwards he was confined in Newgate. After an ecclesiastical trial that was little better than a mockery, he was burned at the stake in Smithfield, the first martyr of the Marian persecution, on February 4th, 1555.

Rogers, SAMUEL, poet, was born at Stoke Newington, London, on July 30th, 1763. He was educated privately and was at first destined for the Presbyterian ministry, but he changed his mind and entered his father's bank. Having a pronounced taste for letters and literary society, he published in 1786 *An Ode to Superstition, with some Poems*. It was a crude effort and was coldly received. In 1792 his *Pleasures of Memory* appeared and at once gave him a wide poetical reputation. His father died in 1793 and left him the family share in the bank. In 1803 he built for himself a house in St. James's Place, overlooking the Green Park, which, under the patronage of the banker-poet, soon became the resort of the most distinguished members of the literary, artistic, musical and dramatic circles of the day, whom he brought together in small parties to the breakfasts for which he became famous. He was credited with a savage tongue, but his heart was kind and well-authenticated instances are numerous of his unostentatiously assisting oppressed children of genius. His own literary activity was seldom intermitted for long. In 1810 he tried his hand at an epic on *Columbus*; *Jacqueline* appeared in 1814 and *Human Life* in 1819. *Italy*, published in 1822 with extreme precautions as to secrecy, was a failure until the edition *de luxe*, with Turner's lovely plates and Stothard's vignettes—upon which he expended £10,000,—appeared (1830), when the illustrations carried the poem into success. On the death of William Wordsworth (1850), he was offered the poet-laureateship, which he had the good sense to decline. He died in London on December 18th, 1855. His art collections and library, sold after his death, fetched £50,000.

Rohan, LOUIS RENÉ ÉDOUARD, Prince de Rohan-Guéméné, Cardinal Archbishop, was born in Paris on September 25th, 1734. In 1771 he was sent as ambassador to Vienna, and there lent himself to such intrigues that Maria Theresa, the Empress of Austria, refused to tolerate him. On his return to Paris (1774) he followed the same

nefarious methods, endeavouring to obtain the favour of Marie Antoinette, but in vain. Though notoriously a profligate, he became in rapid succession Grand Almoner (1777), Cardinal (1778) and Archbishop of Strasbourg (1779). While in the toils of the quack Cagliostro and an adventuress, the wife of the Count of Lamotte-Valois, he was induced to believe that Marie Antoinette was not wholly indifferent to him and would now accept the diamond necklace which she had already refused. Rohan purchased it and parted with it to a sham valet, Lamotte-Valois immediately hastening to London with his spoils (1785). The conspiracy came to light and constituted the notorious affair of the Diamond Necklace which was used to besmirch the poor queen's name. The Cardinal was arrested and sent to the Bastille, but after a year's delay he was tried and acquitted. He was, however, deprived of the office of Grand Almoner. Retiring to Strasbourg, he found his popularity unaffected and was elected to the States General in 1789, but in 1791, when (as a prince of the Church) he refused to take the oath of the Constitution, he withdrew to Ettenheim in the German part of his diocese. His character now began to improve and he befriended the emigrant clergy. In 1801 he resigned his rank as archbishop and died at Ettenheim on February 17th, 1803.

Rohillas, i.e., "Hillmen" (from *Roh*, "hill," "mountain"), a collective name often applied to the Afghans of the Suleiman Mountains, but more especially to those who, during Mahmud of Ghazni's invasions of India, settled in the district north of Oudh now called Rohilkhand. Here they became very powerful and a standing menace to the peace of the land till their strength was broken by the British at the battle of Kobra in 1774. ROHILKHAND now ranks as a division of the United Provinces of Oudh and Agra, being bounded on the N. and N.E. by the Himalaya, and on the W. and S. by the Ganges, occupying an area of 11,800 square miles, and containing a population (1901) of 6,010,527, with Bareilly (117,400) as its capital.

Roland, THE STORY OF. The chief incident of this legend is founded upon historical fact. In 778 Charlemagne undertook an expedition into Spain. After the capture of Pamplona he advanced to Saragossa, but was driven back and on his return his army had to march through the narrow valley of Roncesvalles in the Pyrenees. The Gascons were in hiding upon the wooded heights and, rushing down on the surprised rear-guard, annihilated them and, seizing their baggage, escaped vengeance by flight under the cover of darkness. Among the slain at the battle of Roncesvalles (August 15th, 778) was Roland, one of Charlemagne's paladins. It is also asserted that he escaped the general slaughter only to perish of hunger in seeking to cross the mountains alone. All that is known of him is the record of his name Hruodlandus in a single line of Eginhard's *Vita Karoli*, his rank of prefect and his death in a Pyrenean valley. Around his name—chosen, it has been suggested, as lending itself to song better than that of his companions of equal rank—has

gathered an extensive literature and romance has made him a hero, the peer of Achilles and King Arthur. The *Chanson de Roland* is the oldest of the songs which tell of his legendary deeds. It is said to have been the war-chant sung by the Norman Taillefer at the battle of Hastings (or Senlac) and it was probably composed in the 11th century. The Bodleian Library, Oxford, contains the earliest and best MS. written on vellum, it is believed, in the 12th century. From the various poems we may construct the story of his life, his mother being Bertha, the sister of Charlemagne. They recount his infant valour; relate how he came to possess his sword Durendal; speak of his horse Veillantif; tell how he was eight feet high; and recite his fight with Oliver (hence a Roland for an Oliver, a blow for a blow, each one being the other's equal) and his love for Aude, daughter of Sir Gerard, who died of a broken heart when he fell. The legend became widely popular and exercised an important influence on the literature of Western Europe and on mediæval art.

Roland, MADAME (MARIE JEANNE PHILIPON), the celebrated victim of the French Revolution, was born in Paris on March 17th, 1754, and was the daughter of an engraver. She was extremely fond of reading, and was especially delighted with Plutarch's *Lives*, which she always carried about with her. After the death of her mother she entered a convent for a year, and there pursued her reading without stint. She was as intellectual as she was beautiful, and in 1780 married JEAN MARIE ROLAND DE LA PLATIERE, inspector-general of manufactures at Amiens, who had been born at Thizy, in the department of Rhône, on February 18th, 1734, and was thus her senior by twenty years. They travelled a good deal in Italy, Switzerland, and England between 1780 and 1784, but their home still continued at Amiens, whence M. Roland was transferred to Lyons in 1784. In 1791 he entered the Constituent Assembly as a deputy for Lyons, and most of his public acts were directly instigated by his courageous and brilliant wife. She welcomed the Revolution with effusion and accompanied her husband to Paris, taking part in the deliberations of the Jacobin Club and frequenting the sittings of the Assembly. She was one of the most eloquent women known to history and wielded a marked influence in the councils of the Moderate party. M. Roland became acquainted with Robespierre and other leaders of the extreme party, but generally acted with the Girondins. When his office at Lyons was abolished he went to Paris in 1792 to claim his pension, and was appointed Minister of the Interior, though it was widely known that Madame Roland, who was devoted to him, would practically occupy the post. He was dismissed for sending a very outspoken letter to the king, which was really written by Madame Roland. Later she was arrested as a spy, but speedily released, and her husband was reinstated in his position as minister. He resigned, however, after the execution of Louis XVI., and, on the advice of his wife, fled when the Girondist party fell. She remained in Paris and

was at once arrested and kept in prison for five months, during which time she wrote her *Memoirs*, a remarkably interesting work. On November 8th, 1793, she was led to the guillotine, clad in white, her long black hair hanging down to her waist, bearing herself with great dignity and heroism—one of the noblest and most picturesque figures in modern history. As she reached the statue of Liberty, she exclaimed: "O Liberty, what crimes are committed in thy name!" Her husband, who had found shelter in Rouen, when he heard of her fate, wrote a brief protest against the infamies of the Terror and the murder of his wife, and then proceeded to the park of Radepond, some 12 miles from Rouen, where he flung himself upon a sword-stick and pierced his heart (November 10th, 1793). Madame Roland's *Memoirs* have been often republished, and her *Letters* have also been collected.

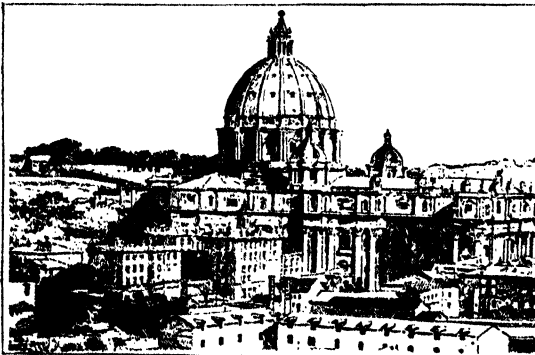
Roller, a bird belonging to the Picarian family Coraciidae, chiefly confined to the Ethiopian and Oriental regions, and absent from the western hemisphere. The bill is long, broad at the base, and compressed towards the tip, and slightly hooked and notched. There are three genera, with nineteen species. The Common Roller (*Coracias garrula*) is found over the Palearctic region as far north as Sweden and the Altai Mountains, and occasionally visits Great Britain. It is about a foot long, and the general plumage is blue, with a mantle of chestnut-brown, its general aspect being so attractive that the Turks call it the Beautiful Crow. The name "Roller" refers to the habit of the male of turning somersaults in the air in the breeding season. The Ground Roller (*Atelornis*) belongs to Madagascar and has so weak a flight—never being seen above the lowest branches—that practically it lives almost wholly on the ground. They are rather local in their distribution, but are not uncommon where they occur. They only come out at dusk. The Cyombo Roller (*Leptosoma discolor*) also is a native of Madagascar. At first sight it might be taken for a cuckoo, of which family it was once thought to be a member. It hovers in the air, uttering a very loud note and striking its wings against its body as it calls. Their cry increases in volume till it reaches a climax, and when there is a congregation of these birds they create an intolerable disturbance. When they cry they puff out the throat so as to give it the look of a hanging bag. They are lazy and stupid, even allowing themselves to be approached and captured or slain. The ill fate of one does not warn the rest, which merely flit to another branch close by. They feed on grasshoppers chiefly, but occasional meals off lizards and chameleons give their flesh an unpleasant odour. When wounded they erect the feathers of the forehead, ears and throat, showering well-aimed blows at their enemy the while with their beak. The Cyombo Roller plays a considerable rôle in the chants and religious rites of the natives. It is remarkable that there have been found in the deposits of the Paris Basin remains of a *Leptosoma*, a bird now, as we have said, restricted to Madagascar.

Roller, a non-poisonous snake belonging to the family Tortricidae, which occurs in the tropical countries of the Old and the New World. It has a stumpy, rounded tail, short, indistinct head, small teeth and smooth scales. It is remarkable in having a rudimentary pelvis with horny spines, or claw-like bones, projecting near the vent. *Tortrix scytale*, native to Guiana, is a little harmless snake that lives in boggy places on worms, insects and small reptiles. The Red *Cylindrophis* of Java is not only made a pet of but is sometimes worn as an ornament.

Rolling-Mill, a combination of machinery used in the conversion of malleable iron into sheets, bars, rods, or wires. It consists of steel rollers placed either in pairs or in threes, one above the other. The heated iron passes between the rollers and receives a certain form according to the grooves in the rolls.

Rolls, MASTER OF, one of the Judges of the English Court of Chancery, now the Chancery Division of the High Court of Justice, so named because he originally had the custody of all patents and grants which pass the Great Seal and also of the Records of Chancery. He was first called Master of the Rolls in the reign of Henry VII., but his office is as ancient as the old Court of Chancery itself. He now sits in the Court of Appeal only. [RECORDS.]

Roman Catholic Church. The Roman Catholic Church differs from all other Christian Churches in this, that it alone can show an unbroken historical continuity from the Apostolic age. The title "Catholic," indicating the claim of the Church to be universal, and not merely



THE VATICAN, ROME.

national, in its jurisdiction, occurs in the 2nd century. The title "Roman," indicating the centre of the Church's unity, or the primacy of the Roman See, was foreshadowed by Irenæus (A.D. 202) when he declared that "with this Church [at Rome] every Church, that is, the faithful everywhere, must agree, because of its more powerful principality," and was common in the

5th and 6th centuries. In the course of ages the Catholic Church has undoubtedly undergone great changes in exposition of doctrine as well as organisation and ritual—changes which, by opponents, are described as corruptions, but by the faithful are upheld as legitimate and true developments of the original divine revelation. Heresies and schisms have arisen from time to time, either from certain bodies returning to a bygone doctrinal position or attempting entirely to reconstruct the constitution of the Church on the basis of Scripture, as was the case with the Protestant Churches of the 16th century; or by standing still while the Roman Church moved on, as in the case of Dr. Döllinger and the Old Catholics, who refused to accept the doctrine of Papal Infallibility defined for the first time by the Vatican Council in 1870. Roman Catholics maintain that the source of all doctrine is to be found in the Word of God, either written in the Bible or unwritten in traditions derived from Christ's oral teaching, and handed down by the Apostles. It is admitted that nothing can be added to this original deposit of faith; but when doubts and controversies arise, the Church, claiming the assistance of the Holy Spirit, evolves, explains, or defines the full meaning of the revealed idea. These decisions have commonly been promulgated after discussion in (Ecumenical Councils presided over or approved by the Roman Pontiff, successor of St. Peter, as head of the Church and Vicar of Christ. It was early recognised that a council of bishops could not define a doctrine in opposition to, or without the assent of, the Pope; and next it was argued that if the Pope, of himself, as supreme pastor, promulgated a doctrine *ex cathedra*, his teaching must be accepted as infallible, and did not need (as was maintained

for some centuries by the Gallican Church) the consent of the bishops or of the Church dispersed. The inference led finally to the above-mentioned decree of the Vatican Council. The Council of Trent, convened in opposition to the Protestant revolt of the 16th century, recapitulated and defined the traditional doctrine of the Church at that time, and reformed or revised the entire code of ecclesiastical discipline. A Catechism of the Council, or the Roman Catechism—an exposition of dogmatic and moral teaching, addressed to the parish priests—was prepared and issued by Papal authority. The Pope also, in 1564, published a Profession of the Tridentine Faith, commonly called the Creed of Pope Pius IV.; and this creed, to which is now added a declaration of adherence to the decrees of the Vatican Council, is solemnly professed on certain occasions by the clergy, and by converts on their reconciliation to the Church. Another outcome of the Tridentine Council was an attempt to secure greater uniformity of usage and correct texts. The Latin Vulgate version of the Bible, declared "authentic"; the Missal containing the liturgy of the Mass, the central act of Catholic worship; and the Breviary, or divine office of psalms, lessons, hymns, and collects, sung in choir

or recited in private daily by all in holy orders, were subjected to a careful revision. There are in communion with the Church of Rome, and acknowledging the supremacy of the Pope, several Churches in Eastern Europe and Asia which do not follow the Latin rite. These are the Greek, the Syriac, the Armenian, and the Coptic rites. The Greek rite has several subdivisions or forms, prevailing in various patriarchates or provinces, namely, the Græco-Romanian, Græco-Ruthenian, Græco-Bulgarian, Græco-Melchite, and pure Greek. Some of these use for their liturgical language the ancient Slav and Arabic. The Syriac rite is divided into pure Syriac, Syro-Chaldaic, Syro-Maronite or Syro-Malabaric. The liturgical language of the Coptic rite in Egypt is Coptic or ancient Egyptian, and in Abyssinia the ancient Ethiopic or Geez language. The Pope is assisted in the government of the Church by the College of Cardinals. The cardinals, styled Princes of the Church, were originally the priests and deacons in charge of the parishes of Rome and bishops of the suburban districts. It belongs to their office to elect the Pope, and they form his council or senate. When complete, the Sacred College consists of 70 members. They occasionally meet in consistory under the presidency of the Pope; but the administration of the affairs of the Church in detail is carried on in Congregations, or committees of cardinals, under a Cardinal Prefect. These Congregations are now twenty in number. The chief are the Congregation of the Holy Office or Inquisition, instituted for the examination and repression of heresies and heretics; the Congregation of the Index, for the condemnation of writings injurious to faith or morals; the Congregation of Rites, which is concerned with all that relates to the liturgy, and has attached to it the important office of conducting the processes for the beatification and canonisation of saints; the Congregation of the Council, to which is reserved the settlement of all questions arising from the disciplinary decrees of the Council of Trent; the Congregation of Propaganda — *de propaganda fide* — which administers the affairs of missionaries in non-Catholic countries. Other Congregations are the Consistorial, Oriental Rite, Apostolic Visit, Bishops and Regulars, Residence of Bishops, Ecclesiastical Immunity, Discipline of Regulars, Indulgences and Sacred Relics, and Fabric of St. Peter's. The "Roman Catholic" population of the world is estimated at over 265,000,000, that of Europe being 177,600,000. The number of Catholics in England and Wales is over 1,500,000; in Scotland, 400,000; and in Ireland, 3,308,661. The appellation of "Roman Catholic" is frequently resented by Christians accepting the direction of the Holy Father, but it may confidently be asserted that the description is never employed by way of reproach or derogation, but simply to discriminate among the various branches of the Christian Church, some of which expressly claim an equal right to the use of the word "Catholic." All that can reasonably be expected of the historian or the journalist is that he shall use a term that will make his meaning clear to readers. And it is certain

that it is only in this sense and with this object that the phrase "Roman Catholic Church" has obtained a permanent foothold in every department of literature.

Romanes, GEORGE JOHN, biologist, son of the Rev. George Romanes, professor of Greek in the University of Kingston, Canada, where he was born on May 20th, 1848. In that year his father inherited a considerable fortune and they removed to London. After being privately educated he entered Caius College, Cambridge, and graduated in the natural science tripos (1870). Devoting himself to research, from 1874 to 1876 he studied under Professor Burdon-Sanderson in the physiological laboratory at University College, London. Charles Darwin encouraged him to apply the theory of natural selection to the problem of mental evolution, and, being possessed of ample private means, he built a laboratory at Dunskaith. The result of his investigations was given in his Croonian lecture in 1876. His paper, *Physiological Selection*, contributed to the Linnean Society in 1886, which gave rise to much controversy, he regarded as his chief contribution to science. *Darwin, and after Darwin* (1893), dealing with the post-Darwinian problems arising out of questions of heredity and utility, was the result of his admiration for Darwin and his endeavour to re-enforce his master's teaching. An ardent sportsman, an enthusiastic lover of music and of poetry, a writer of verse, for several years his faith in the Christian Revelation suffered eclipse, but before his death his mind reverted to the orthodox position. "I have now come to see," he said, "that faith is intellectually justifiable," and "It is Christianity or nothing." In 1879 he married Ethel, daughter of Andrew Duncan, and settled in London, but removed to Oxford in 1890, where his health failed and where he died on May 23rd, 1894. In 1891 he founded the lectureship which bears his name, the first lecture, on the subject of *Mediæval Universities*, being delivered by W. E. Gladstone on October 24th, 1892.

Romanesque, in architecture, the style that prevailed in the early mediæval age from the 5th to the 12th century. The 1st period (5th to 11th) was a more or less debased form of Roman; but in the 2nd period (11th and 12th) it developed peculiarities of its own. The semi-circular arch and the massive masonry of Saxon and Norman architecture were borrowed from Romanesque.

Roman Law is a subject important to be studied both from a practical and a historic standpoint—from a practical because the law of many European nations is founded on it; and from a historic because in its study can be traced the progression of mankind from primitive legal conceptions to those most highly civilised. It may be said, indeed, that the history of the Law of Rome is the history of the progress of the human mind. The earliest Roman Law of which we know anything (and that not much) is the Law of the XII Tables—a code compiled by a commission called the *Decemvirs* ("ten men") in or about 450 B.C. This code was, no doubt, merely the

reduction of then existing laws and customs into written, concise form. It became at once a sort of fetish—semi-sacred in character—and might have hindered the development of Roman Law very seriously, had it not been for one fact. This was that the XII Tables only applied to Roman citizens. They alone could perform the ceremonies (some of which had a religious basis) enjoined by that law. They alone could bring actions in the form enjoined. But there were within the city a number of people not Roman citizens—aliens who had settled there for trade and other purposes; and as Rome grew in power, in size and in importance, the number of these aliens (*peregrini*) increased. It was, of course, necessary for the *peregrini* to be governed by some laws. Disputes arose between them, and between them and Roman citizens. They made contracts; they committed and suffered wrongs. And as the Law of the XII Tables did not apply to them, a magistrate was appointed whose special care it was to make rules to settle these questions. At first, no doubt, the magistrate decided each case by rule of thumb—in other words, according to what he thought was right and fair. But gradually a custom arose for the magistrate, on being elected to office, to publish an edict, or proclamation, setting forth the rules which were to be applied during his year of office. Each magistrate adopted the edict of his predecessor, merely adding to it anything of his own; so that the Prætorian Edict gradually became a great code of law. And in course of time, it was seen that this edict, the product of long experience and of trained reason, was better in every way than the inelastic Law of the XII Tables. The body of the law was also modified, from time to time, by *Leges* (statutes of the people acting as a legislature), by *senatus-consulta* (laws enacted by the Senate) and, after the fall of the Republic, by *Rescripta* (laws, or decrees, made by the Emperor).

Law of the Family. In ancient Rome, the family, not the individual, was recognised—a marked difference from the legal systems of the Teutonic nations. A family consisted of the house-father (*paterfamilias*) and the persons who were “under his hand,” or “in his power.” There was little difference, in one point of view, between a wife, a son, and a slave (“son” includes daughter and all descendants through males). The house-father could sell them, whip them, even kill them. Gradually the position was modified. It became unlawful for a father to kill his son. Then it became unlawful for him to sell him into slavery. Finally a son was recognised as being capable of holding some property of his own: though even to the very latest times, a son in his father’s “power” had no property—it was all the father’s with slight exceptions. A father could sever the tie of the paternal power. In early days he did this by a fictitious legal action before a magistrate, accompanied by many ceremonies which had to be strictly performed. These ceremonies were, one by one, abolished; at last the fictitious action was abolished; and the son could be released by a simple declaration before a magistrate. A Roman house-father could take a son by adoption; and so

make him as much his son as if he had been born so.

The Roman wife, in early times, differed somewhat according as to whether she were a patrician or a plebeian. Patricians married by a ceremony called *confarreatio*—a religious rite; and could only be divorced by *diffarreatio*—also a religious rite. Other marriages were by *coemptio*, or fictitious sale, and by *usus*, or prescription. In all marriages except *confarreatio* a wife did not pass into her husband’s absolute power unless she remained in his house for 12 months without a break. Gradually a custom grew up for wives to take a holiday for a few days each year; *confarreatio* fell into disuse; until in the end no wife was ever “in the hand” of her husband, but was comparatively independent. As the law progressed, marriage came to be looked on as a contract merely. It required no ceremony to make it; and equally it could be dissolved by both parties, or either party. No decree of a court was necessary for divorce, even in Christian times. After divorce the husband was obliged to give back the wife’s dowry, which he only had the management of during the marriage—he could not dispose of the property.

The position of the slave improved, also, with the growth of civilisation and the introduction of Christianity. In early times, the freeing of slaves was not encouraged. It was looked upon as a waste of property. Nor could it be accomplished except by an act of manumission of the most formal and technical character. But the Christian emperors encouraged manumission and reduced the formalities of it; until finally the master had merely to declare his intention of granting freedom and the slave became a freeman.

Citizenship of Rome was at one time a high privilege. Even under the early Empire, it was possible for St. Paul to boast, “With a great price obtainedst thou this freedom, but I was free-born.” For in his time a citizen had privileges that other subjects of the Empire had not. The original citizen of Rome was a man who was born a member of a Roman (or Quiritarian) family, that is, descended from the original tribes who founded Rome. As the Romans extended their conquests, they did not give to their new subjects the full privileges of citizenship. The early-conquered peoples of Italy were given a sort of lesser citizenship and were called *Latini*. Later-conquered nations and cities were sometimes admitted to the privileges of *Latinitas*. Gradually cities and states here and there were accorded full Roman citizenship, until at last, in A.D. 213, the Emperor Caracalla made all freemen of the Empire full citizens.

The law of property amongst the Romans has formed the subject of a good deal of discussion. It appears that two systems of ownership ran side by side. One was the ownership known to the XII Tables, possible only to Roman citizens, and called *dominium*; and the other was that common to all mankind, recognised by the magistrates in respect of the *peregrini*, and called “bonitarian” ownership. But *dominium*, or full Roman ownership, could only be acquired in a limited number of ways, many of them highly technical, so that “flaws in title,” as

we should call them, were easy and common. The magistrates, to remedy this state of things, recognised possession as being, for all practical purposes, as good as ownership—provided the possessor had acquired possession lawfully and not by force or fraud. Possession by A of B's goods by B's permission, also, did not give A any right to the goods. The technicality of the law of *dominium* thus led to the working out of a complete system of property based on possession and founded on reason. The prætor (magistrate) enforced his own code of possession indirectly. If by reason of a flaw in the title the *dominium* of property had not passed to a purchaser in good faith, the prætor would protect that purchaser by an interdict, or injunction, forbidding anybody to interfere with his possession thereof. This finds a parallel in English law in the way the Chancellors protected equitable owners of property from being disturbed by persons with merely a technical legal title. Title to property was acquired by long possession. He who received in good faith (*e.g.*, by purchase or gift) a thing from a person not the owner, acquired the ownership of it, if a movable thing, by three years' possession. If the thing were immovable, by 10 years' possession if the parties lived in the same province, and 20 years' if they lived in different provinces. Some things could never be acquired by long possession, *e.g.*, stolen property, a sacred or religious thing, and a runaway slave. And a person really a freeman could never become a slave by long possession (*e.g.*, if a free-born citizen were kidnapped). By English law, a mere promise to give is not effectual. The Roman law made a promise to give as effectual as a promise to sell. But gifts of more than a certain value had to be registered.

The *law of testamentary and intestate succession* was subject to a long course of development. The early Roman will was made in the presence of the people—was, in fact, a public act of a legislative nature. Later, wills were made before a magistrate. Later still, a will became a private conveyance. It could be either by word of mouth before witnesses, or in writing. At first there was complete liberty. The testator could name as his heir anybody he pleased. He could also give such legacies as he chose. By later law, a man could not disinherit his natural heirs except by expressly naming them in his will and disinheriting them, by name. Later still, it was enacted that the natural heirs, if they were children, or brothers and sisters, could not be entirely disinherited; but must have at least one-fourth of the estate. A testator, also, could not dissipate all his estate in legacies. He must leave at least one-fourth to his heir. The reason was that the heir had to meet all liabilities; and, if the estate was insufficient, was personally liable. To understand this branch of Roman Law thoroughly, it must be remembered that the primary object of the early will was rather religious than secular. That is to say, the testator had for his object the appointment of somebody who should carry on the religious rites of his family, without which the soul of the deceased would not rest in the future world. So that the testator first of all appointed an heir (or several heirs) and on

this heir devolved the universal succession to the testator. He succeeded not merely to all the property but to all the liabilities. But the testator had, at first, an unlimited power of giving legacies to persons other than the heir; and it used to happen, not seldom, that the legacies so depleted the inheritance that the residue of the property was insufficient to meet the debts. A will which did not name an heir was useless and fell through entirely. Such a document began with the phrase, "Let A B be my heir"; and, indeed, until the law was altered by Justinian, the appointment of the heir had to be the first thing in the will and all legacies given before the appointment were void. Justinian altered the law of wills at one stroke. He enacted that the heir was to be liable for his testator's debts only to the extent of the inheritance received by him and no more. Thus the heir became a mere officer, like the English executor, bound to carry out the testator's wishes and to administer his estate; but no longer, as in former times, the person who continued, as it were, the personality of the deceased after the latter had died.

In the same connection is to be noted the development of the Law of *trusts* (*fidei commissa*). The old Roman law did not allow certain people to benefit under wills. Thus aliens and Latins could not benefit. But in the reign of the Emperor Augustus a new way of testamentary disposition was legalised. The testator could make, in addition to, or instead of, a formal will a codicil, or informal document of testamentary character, which was binding on the conscience and honour of the heir, whether that heir was appointed by will or succeeded in default of a will. The codicil could be executed without formalities, and could dispose of property in favour of anybody, whether Roman, alien, or Latin. And such was the flexibility of this kind of instrument that it came into common use. Indeed, at the end of a formal will, it became customary to insert a clause that if the will should fail as a will by reason of any informality, it should take effect as a codicil. By this device, every defect in the will was cured and another blow was dealt at the formalism of the ancient law.

As to *intestate succession*, the law of the XII Tables was that heirs were of three classes, viz., (1) *Sui heredes*, or persons under the *potestas* of the deceased who became emancipated by his death. Thus it will be seen that a son who had been released from his father's power in the father's lifetime was not in the first class of heirs. (2) *Agnati*, or people related to the deceased through the male line in such a way that had they been all alive together, they would have been under his *potestas*. (3) *Gentiles*, or members of the same *gens*, or clan. Class 2 did not take if there were any persons in class 1. Similarly, *gentiles* did not enter so long as there were any *sui heredes* or *agnati*. Thus it will be seen that the law of inheritance was based, not on the natural ties of blood, but on the artificial ties of the Roman family. The history of this subject down to the time of Justinian may be said to consist of the

efforts of the jurists to enforce the claims of blood-relationship as against the artificial ties of agnateship. The praetors introduced two great changes:—(1) they allowed emancipated children to take a share with the *sui heredes*; and (2) they gave distant blood relations a claim in front of mere members of the clan (*gentiles*). Some time afterwards, women were allowed limited rights of succession to their children; and children to their mothers. Justinian's legislation established succession on the basis which now prevails, with greater or less modification, in all civilised countries. He divided heirs into three classes:—(1) Descendants, who excluded all others. Children took equally. Grandchildren took their deceased parent's share. (2) Ascendants, along with brothers and sisters. Children of a deceased brother or sister took their parent's share. (3) Cognates—that is, next of kin—whether related through males or females. The nearer degree excluded the one more remote and persons of the same degree shared equally. This is almost the English law of to-day, save that the Romans made no distinction between landed property and any other, as the English law does.

The Roman law of contract differed essentially from the English. English lawyers early discovered the principle that a contract was only enforceable if it were made for valuable consideration—i.e., if the party making a promise was to get something for his promise. The Roman Law knew not this doctrine. The ancient law recognised only contracts made with certain strict formalities. The promissor had to utter certain words. But the magistrates gradually improved on this until, at last, the validity of the contract merely depended on the fact whether or not the one party had promised and the other party had accepted the promise. No particular form was necessary. Here we see a shining example of the development from the primitive *régime* of formalism to the more civilised idea that transactions between man and man depend on the intention of the contracting parties.

It is, however, in the law relating to *wrongful acts* (e.g., assault, damage and the like) that the progress from semi-barbarism to correct juristic ideas is best seen. The ancient Roman who was injured, by (say) the runaway horse or ox, or the negligent slave of his neighbour, took action against the thing that caused the injury; and the horse, ox, or slave was given up to the aggrieved party to be dealt with by him as he pleased. This notion is to be found in other primitive codes. Our Saxon ancestors had their *deodand*, or confiscation of any animal or instrument by which death had been caused. There is a similar provision in the Mosaic law. For personal injuries caused by one Roman to another, there was a sort of tariff—so much for a blow on the cheek; so much for a blow inflicted in public; so much less for a blow given in private. Gibbon tells the story of a young patrician who amused himself by running about the streets striking on the cheek every passer-by. He was followed by a slave, carrying a purse, out of which

the slave offered to each assaulted person the legal compensation. In course of time the magistrates found a better way. Ignoring the fixed penalties, they awarded to a person wronged, damages proportionate to the actual loss sustained and to the extent of the insult or injury inflicted. The Roman Law divided wrongs (*delicta*) into two kinds, namely: (1) *Injuria* and (2) *Damnum Injuria*. (1) *Injuria* was a violation of a right which a freeman has in respect of his person. Thus, an assault was *injuria*; so also were false imprisonment, defamation by word, writing, or caricature. To accuse one of insolvency, as by taking possession of his goods when he owed nothing, was *injuria*. And the Roman's house was his castle to such an extent that it was *injuria* to enter it against his will, even to serve a summons. The administration of love-philtres was also an offence. *Injuria* might be aggravated (*atrox*) by reason of the violence of the act (e.g., beating with a scourge, or sticks); of the place, e.g., to strike a man in the market-place; of the person, as when a freed slave struck his former master. If *injuria* were committed against a member of the family, the *paterfamilias* sued for two sets of damages, one on his own account, and one on account of the member of his family who had been injured. (2) *Damnum Injuria* was a wrong to rights of property. Theft, except in cases of cattle-stealing, house-breaking, burglary, stealing from public baths, and theft from a burning house, was not punishable as a crime. The owner of the stolen property merely brought an action for damages; and these damages varied according as to whether the thief was caught in the act or not. A thief caught in the act—i.e., before he had deposited his booty in the place where he intended to hide it—was condemned in four times the value of the stolen goods. If not caught in the act, he only paid double value. Theft with violence carried the four-fold penalty also. As to damage to property inflicted purposely or by negligence, the history of the law is interesting. The XII Tables enumerate a list of injuries, and assigns penalties. This was found inconvenient, because the list was not and could not be complete. Therefore, in 286 B.C. was passed the *Lex Aquilia*, which aimed at a general rule. This *lex* enacted that in all cases where direct injury was done to property, damages should be paid by the wrongdoer. In the case of slaves and cattle, the damages were the highest value the property bore within the year preceding the injury. In other cases, the highest value within the preceding 30 days. But this statute was not complete, because it did not provide for indirect injuries. Thus, if A shut up a slave belonging to B and let him starve to death, B had no remedy under the statute; nor if A frightened B's oxen so that they ran over a precipice. The reason was that there was no physical contact between the wrongdoer and the thing damaged. After a while the lawyers and the praetors amended the law by allowing the property-owner whose property was thus indirectly damaged to have an action which was called the *actio utilis*—or action by analogy. The damages given were

not the actual direct loss, or intrinsic value of the thing damaged, as in English law. The plaintiff could recover indirect damage. Thus, if A killed a slave belonging to B, and the slave had been nominated heir to an estate worth 100 pieces of gold, B was entitled to (a) the value of the slave, and (b) the 100 pieces of gold.

As to what constituted *negligence*, the Roman Law forms the basis of the law of most civilised countries to-day. The Institutes give two cases as examples:—A man is casting javelins and kills a passing slave. If the javelin-player is a soldier practising in the drill ground, he is not liable. But if he is a soldier and casting his javelin in a place not set apart for military exercises, he is liable. So also is he, whatever the place be, if he is not a soldier. Again, a husbandman is pruning a tree and a branch drops on the head of a passing slave. If the place is a public road or a right-of-way, the pruner is liable unless he shouted a warning. Want of skill might be negligence in the case of a person who undertook something requiring skill. Thus, a charioteer who unskillfully drove his team and injured a slave belonging to A must pay compensation to A. It was no defence for the driver to say he did his best, unless his best was the best that skill could do; because it was negligent of him to undertake to drive a team of horses unless he had the necessary skill.

The *procedure of the courts* is instructive in its history. Under the law of the XII Tables, the plaintiff summoned (verbally) the defendant to come into court; and if the defendant refused to come, the plaintiff might first call witnesses to see the refusal, and then employ force to drag the defendant before the judge. It was not until some time after the XII Tables that the Praetorian Edict made it an offence for the defendant to refuse to come when summoned. After the defendant had appeared before the Court, the first thing done was to ascertain what the dispute was about; and as soon as this had been done, the cause was referred to the decision of a person called a *judex*, or *arbiter*. The prætor instructed the *judex* as to what the point for his decision was and then the whole case passed from the prætor's hands. In later days the point for decision was put into writing and was called a *formula*. The *judex*, or *arbiter*, was not a paid judge, nor even a lawyer. He was merely a private citizen, chosen by the prætor out of a list kept for that purpose, and acting without remuneration. The mode of enforcing the judgment of a court was very different from the modern method. The Roman way was to seize the person of the debtor, not his property. Antoninus Pius (A.D. 138–161), who first made it punishable to kill or cruelly entreat a slave, also enacted that the property and not the person of the debtor should be seized and sold to pay a judgment debt. The old XII Tables exhibit a curious picture of life and manners. After judgment, the debtor was to have 30 days in which to pay. In default, the creditor might seize him and take him before the prætor, where he was required either to pay at once or find a surety or substitute to answer for the debt. In default of this, again, the creditor removed him and put him in chains.

But the debtor was allowed one more chance. On three successive market-days the creditor led him, in chains, before the prætor in open court, and with a loud voice proclaimed the amount of the debt, in the hope that some compassionate citizen would take pity on the poor debtor. If nobody paid on the third of these appearances, the wretched debtor became his creditor's slave. We see here the difference in idea between the primitive and the modern notions. To-day, the State summons the defendant to appear and, after judgment, enforces payment by its *huissier*, sheriff's officer, or other official. The ancient method left everything in the hands of the creditor. It merely legalised self-redress and prescribed certain limits beyond which the successful litigant could not go.

The principal Roman jurists (*juris-consulti*) were Papinian (A.D. *circa* 180), Ulpian and Paul (same period), Modestinus (*circa* A.D. 200) and Gaius (A.D. 120). The writings of these five were of such weight that in A.D. 426 the Emperor Valentinian enacted a law called the Law of Citation, providing that their works only should be cited in courts of law; that a majority of their opinions should be binding on the judge; and that in case of equal division, Papinian's opinion should prevail. Writings of Ulpian and Gaius still remain to us; but there is no fragment of Papinian, who seems to have been esteemed as the greatest of all that great race of jurists to whose arduous labours and highly-finished reasoning we owe the invaluable *Corpus Juris Civile*.

Romansch, or RUMANSCH, a Romance (Neo-Latin) language, formerly current throughout the Central and Eastern Alps of Switzerland and Tirol, but now reduced by continued German and Italian encroachments to three enclosed groups. These are Romansch proper, spoken by about 40,000 in the canton of the Grisons, East Switzerland; Ladin of Tirol, spoken by about 50,000 on the east bank of the Upper Adige; and Ladin of Friuli, spoken by about 200,000 in the Tagliamento basin, North-East Italy and thence to Goritz, in Austria. This gives a total of 290,000 people using Ladin-Romansch, or Rhaeto-Romance, speech, as it is also called. The vocabulary is mainly Latin, while the phonetics and structure resemble those of Brescia, and other rude dialects of North Italy. The oldest monuments of it occur in some Friuli inscriptions, dating from the 12th century, and though its literature is chiefly religious, it is also employed in some national poetry and newspapers.

Romans, EPISTLE TO THE, was written by St. Paul and is of doctrinal importance. Although it has been doubted whether the Epistle was of a piece, or a patchwork of different letters, it is now generally agreed that it is homogeneous. It is thought to have been written from Corinth about A.D. 58. The first part is doctrinal and the latter deals with practical matters. Many commentaries upon it have been written, one of the best known in English being that of Jowett.

Romany. [GYPSIES.]

Rome, the mistress of the ancient world, the seat of the popes, and since 1870 the capital of the kingdom of Italy, situated mainly on the left or eastern bank of the Tiber, about 15 miles from its mouth. The river, which has here an average breadth of 200 feet, is spanned by several bridges in its course from north to south through the city, and about midway forms an island (Isola Tiberina, or di Bartolomeo). On the left bank rise the famous seven hills of ancient Rome, namely (from south to north), the Aventine (150 feet), Cælian (165 feet), Palatine (165 feet), Capitoline (165 feet), Esquiline (245 feet), Viminal (175 feet), and Quirinal (170 feet)—from which physical features the city is often called the Seven-hilled City. Mediæval and modern Rome, however, is built chiefly on the plain (the ancient Campus Martius) nearer the river, and on the slopes of the Pincian Hill to the north, extending thence eastwards to the Quirinal and Viminal. The smaller part of Rome on the right or western bank includes the Borgo, to the north, with St. Peter's, the Vatican, and the Castello S. Angelo, and the Janiculan Hill, with Trastevere, to the south. The entire city is surrounded by a wall 14 miles in circuit, with 13 gates, the wall on the left bank being substantially identical with Aurelian's Wall, built in the 3rd century; while the Leonine Wall (A.D. 848) round the Borgo was extended in the early 16th century. Very considerable modern improvements have been made since 1870. Wide new thoroughfares have been constructed, squalid, though picturesque, mediæval quarters, such as the Ghetto, have been swept away, and the Tiber has been embanked; but the too numerous blocks of ugly tenement-houses, due to the speculative builder, have added a modern feature that might well be spared. Rome abounds in open squares (piazzas) adorned with fountains, obelisks, or statues, the largest being the Piazza di S. Pietro, flanked by huge semi-circular Doric colonnades by Bernini, and one of the best-known being the Piazza di Spagna, the centre of the "Strangers' Quarter," with the Scala di Spagna, a flight of steps frequented by artists' models. The chief streets of modern Rome are the narrow Via del Corso, running northwards from the centre of the business quarter to the handsome Piazza del Popolo, and the Via Nazionale and the Corso Vittorio Emanuele, diverging respectively to east and west from the southern end of the Corso.

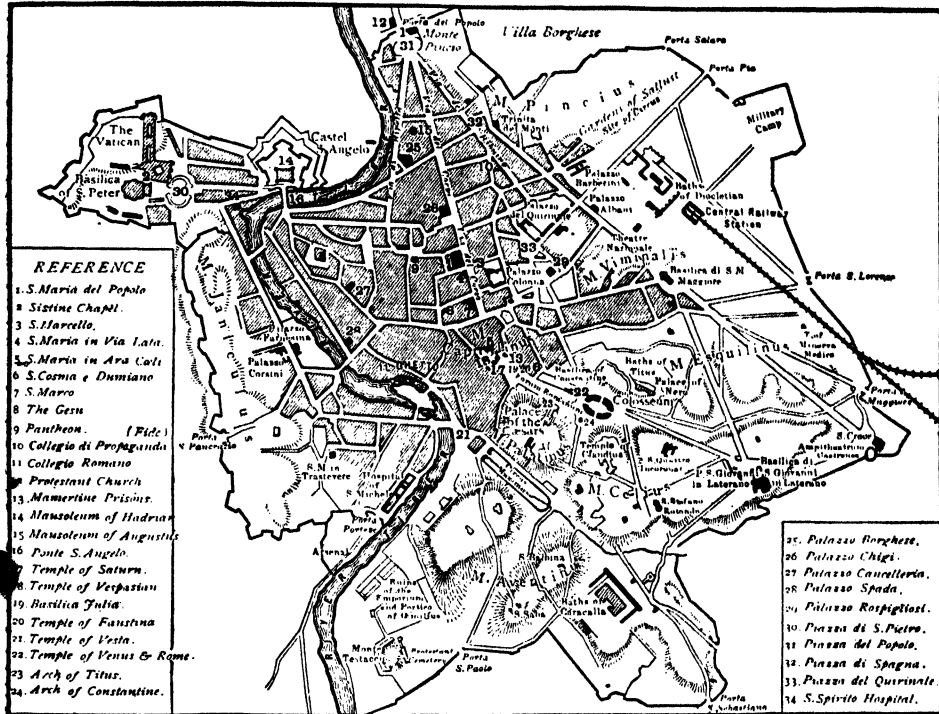
The remains of ancient Rome have suffered severely from the vandalism and the neglect of past centuries, but they are now carefully preserved. The Forum Romanum, in some places nearly 40 feet below the present street-level, has been in great part excavated, and the Via Sacra may be traced through it, passing the too scanty remains of the Colonnade of the Twelve Gods. The temples of Vespasian, Concordia, Saturn (491 B.C.; eight columns standing), Castor and Pollux, and Faustina (now the church of S. Lorenzo in Miranda); the Arch of Septimius Severus; the Rostra, erected by Julius Cæsar; the Basilica Julia; the Column of Phocas (A.D. 608; the last-erected monument); the palace of the Vestal Virgins; the huge arches of the Basilica of Constantine are among the

famous relics of the past. The Arch of Titus (A.D. 70), with reliefs of the plunder of Jerusalem, stands on the Velia, the low hill between the Palatine and Esquiline. Beyond it are the enormous ruins of the Colosseum or Flavian Amphitheatre (A.D. 80), which could seat 87,000 spectators, and the Arch of Constantine (A.D. 312) at the beginning of the Via Triumphalis, which leads on to the Baths of Caracalla, the largest ruin in Rome, and the Circus Maximus (now occupied by the Jewish cemetery and the gas-works), in which 250,000 spectators found room. To the north-east of the Forum lay the Fora of the Emperors, still in great part buried, except a portion of Trajan's Forum, the most magnificent of all, from which rises Trajan's Column (147 feet), with its spiral band of reliefs of the Dacian campaigns. To the south of the Forum rises the Palatine, the site of the primitive Roma Quadrata, now covered with the remains of the huge palaces, temples, and halls of the earlier emperors. Amongst the other ancient remains in Rome are the round Pantheon (now the Church of S. Maria Rotonda), with the tombs of Raphael and Victor Emmanuel; the Column of Marcus Aurelius (95 feet); the Castello S. Angelo or Mole of Hadrian, built by that emperor as his tomb, and now a fort; the Mausoleum of Augustus; the Baths of Diocletian (for 3,600 bathers); the Theatre of Marcellus; the Pyramid of Cestius; the Tomb of Cecilia Metella (on the Appian Way), etc. In the desolate and unhealthy Campagna outside the walls are seen the long lines of huge arches belonging to the immense aqueducts (some still used) that supplied the ancient city with water. Outside the walls also are the Catacombs, at first made for burial-places, but afterwards used by the early Christians for meetings and as refuges.

Ancient Rome contained about 300 temples, and modern Rome has about as many churches, 80 of which are dedicated to the Virgin. St. Peter's, St. John Lateran, S. Maria Maggiore on the top of the Esquiline, S. Paolo fuori le Mura ("outside the walls"), perhaps the most gorgeously-decorated church in Rome, and S. Lorenzo fuori le Mura are the five Patriarchal churches, to one or other of which all believers throughout the world are supposed to belong. With Santa Croce in Gerusalemme and S. Sebastiano, they make up the famous "Seven Churches of Rome" frequented by pilgrims. The six first-named, along with S. Agnese fuori le Mura and S. Clemente (with its upper and lower church, resting in turn upon older pagan structures), are also known as the eight Basilican Churches. St. Peter's, adjoining the Vatican, perhaps the most famous and certainly the largest church in the world, was begun in 1506 and consecrated in 1626. It has an area nearly twice that of St. Paul's in London, while its dome rises to the height of 403 feet. S. Giovanni in Laterano, adjoining the papal palace of the Lateran (now a rich museum), claims to be the mother-church of all Christendom. Beside it are its ancient Baptistry and a building enclosing the Scala Santa, brought from Pilate's palace in Jerusalem in 326. Many of the Roman churches contain treasures of art or are interesting for their

structure or history. S. Pudenziana, with 4th-century mosaics, claims to be the oldest church in Rome; S. Stefano Rotondo to be the largest round church in existence; S. Agostino (1479-83) to be the earliest domed church in Rome. S. Maria sopra Minerva is the only ancient Gothic church in the city. S. Pietro in Vincoli contains

the summit of the Capitol, approached by a flight of steps, are the Palazzo del Senatore (civic offices), the Palazzo dei Conservatori (antiques and paintings), and the Capitoline Museum (celebrated statues), forming three sides of the Piazza del Campidoglio, designed by Michael Angelo, in the centre of which is an antique equestrian statue of



PLAN OF ROME.

Michael Angelo's famous statue of Moses; and S. Maria delle Pace Raphael's beautiful frescoes of the Sybils. The Gesù is the chief church of the Jesuits and San Carlo al Corso is the fashionable church.

The Vatican Palace, the residence of the Pope, enjoys along with the Lateran the privilege of "exterritoriality." The massive building, said to include 11,000 apartments, contains the finest extant collection of ancient sculpture, with many celebrated statues, a rich gallery of paintings, a famous library, and other collections, besides the Sistine Chapel, adorned with frescos by Michael Angelo and other masters, and the Stanze and Loggie, with paintings by Raphael and his contemporaries. The Quirinal Palace, another huge pile on the hill of that name, is occupied by the King of Italy. In the Piazza del Quirinale are two famous marble groups of Horse-Tamers. On

Marcus Aurelius. A huge monument to Victor Emmanuel has been erected on the north side of the Capitol. The numerous mediæval and Renaissance palaces of the Roman nobility, the Sapienza (university), the National Bank, various public offices, and the Protestant cemetery with the graves of Kents and Shelley, also deserve mention.

The art-collections of Rome, especially the collections of ancient art, are among the richest in the world. The priceless collections of the Vatican, the Capitol and the Lateran have been mentioned. Others are the national museum in the Baths of Diocletian for recently-discovered antiquities; the Museo Boncompagni (antiques); the Museo Kircheriano (antiques, ethnographical, and prehistoric); the Borghese gallery of paintings; the Barberini, Doria, Colonna, Torlonia, and Corsini galleries of paintings and antiquities; the collections in the Mattei, Medici, and Wolkonsky Villas; the

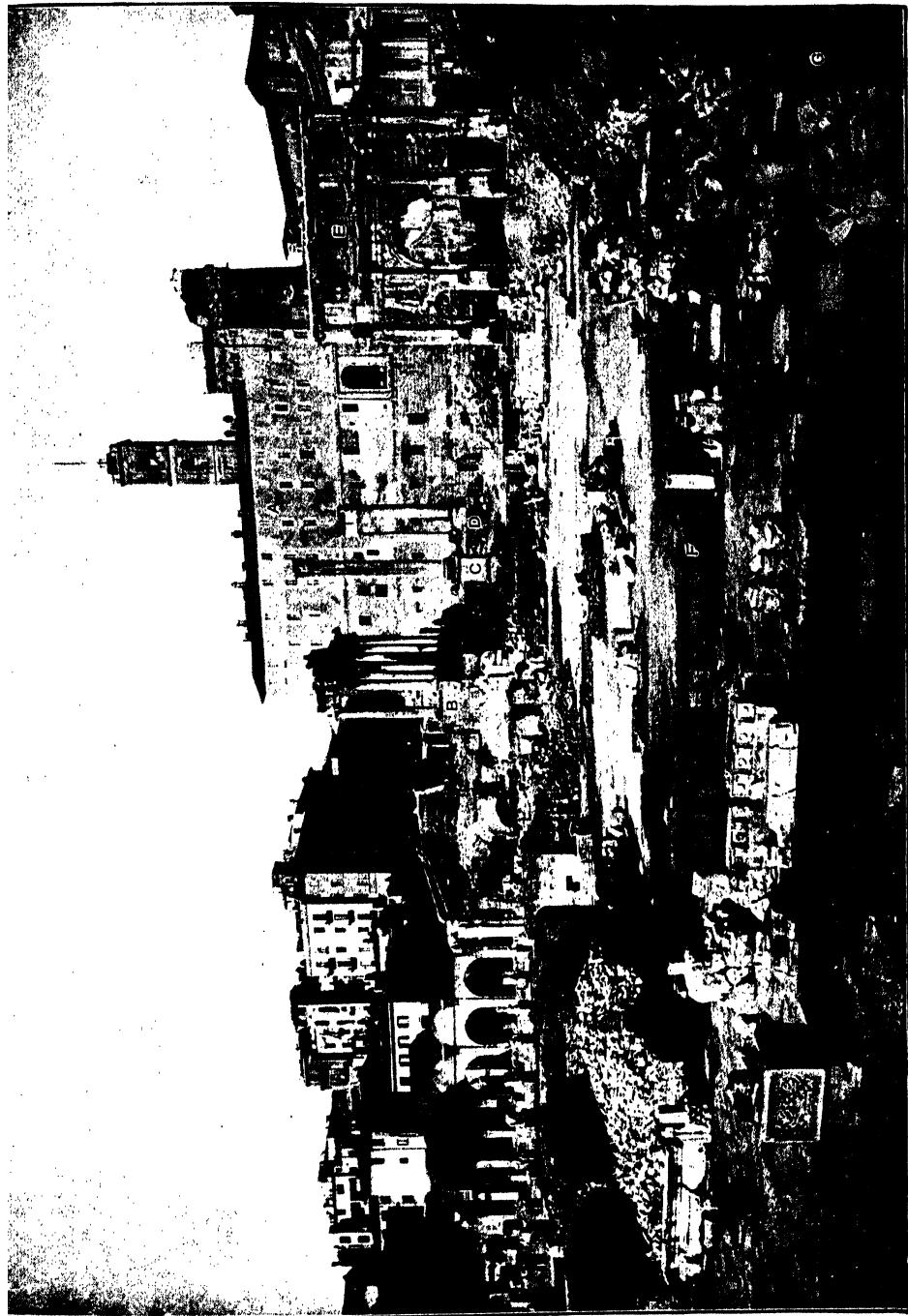
Villa Farnesina, etc. Rome has little commerce and no manufactures of importance. The papal and royal courts, the garrison, and the foreign visitors are its main sources of revenue. The population in 1901 was 462,783, or smaller than that of Naples.

History. According to the traditional account, Rome, the Eternal City, was founded in 753 B.C., but this is purely fabulous, seeing that the site was occupied in the Neolithic and Bronze periods, as explorations have proved. Its early history, although containing certain undoubted facts, is so intermixed with legend that it is difficult to know at what point the authentic history of Rome begins, especially when it is remembered that almost all the public documents perished at the burning of the city by the Gauls (390 B.C.). It is not until a century later, the time of the war with Pyrrhus (281 B.C.), that full reliance can be placed upon the narrative. Rome (as we have seen) was situated on the left bank of the Tiber, about 15 miles from its mouth; it was originally a Latin town, with certain Sabine and Etruscan elements in smaller proportion. It appears at first to have been an asylum for freebooters, but gradually, owing to its favourable position and the sturdy valour of its inhabitants, from a mere village became a town of considerable importance. Its government, according to tradition, was at first regal, and the names of seven kings are handed down to us (Romulus, Numa Pompilius, Tullus Hostilius, Ancus Marcius, Tarquinius Priscus, Servius Tullius, Tarquinius Superbus). The tyranny of the last king caused a revolt, and the monarchical was replaced by a republican form of government, under two officers called Consuls, who were elected annually; this arrangement, with slight intermission, continued in force until the establishment of the Empire, and nominally long afterwards.

Republican Rome. After the capture of Veii, one of the chief cities of Etruria (396 B.C.), Rome was taken and sacked by the Gauls (390 B.C.), but was afterwards restored by Camillus. The long Samnite wars, which ended in 290 B.C., insured to Rome the possession of nearly all Central and Southern Italy. Then, turning her attention outside Italy, Rome attacked Carthage, seized the west of Sicily, took Sardinia, conquered half of Gallia Cisalpina and part of Illyria. The second Punic War (218-201 B.C.), against the great general Hannibal, ended in the final triumph of Rome and the acquisition of West Sicily and Spain. Further conquests followed in Macedonia, Syria, and Galatia; in Gaul, Liguria, Spain, and Illyria; Greece was reduced to a Roman province, and Carthage and Corinth were taken (146 B.C.). The guerilla chief Viriathus and the Spanish town of Numantia were subjugated, and a portion of Transalpine Gaul formed into a province. From this time Rome may be considered as the chief power in the world; but her old virtues had already begun to deteriorate and struggles, largely economic and agrarian in origin, began between the new nobility and the populace. The attempts of the Gracchi to improve the condition of things did not end the struggle. Several wars followed in quick suc-

cession, the Jugurthine and Servile Wars, wars against the Cimbri and Teutones, against the formidable Mithradates, and the Social War, arising from the claim of the Roman allies to the rights of Roman citizenship, and ending in their subjugation but admission. The conflict between Marius and Sulla created a reign of terror at Rome, in which hundreds were butchered, and resulted in an oligarchic reorganisation of the Constitution. After the death of Sulla the conflict between aristocrats and democrats set in again; it was for a while checked by the formation of the so-called First Triumvirate (Cæsar, Pompey, and Crassus), only to break out once more between Cæsar and Pompey. By this time the democratic programme initiated by the Gracchi had nearly all been carried or become antiquated, and the breakdown of the old constitution was manifest, especially in connection with provincial government. After the murder of Julius Cæsar (March 15th, 44 B.C.), the conspirators, who had been unable to get power into their hands, were defeated at Philippi (42 B.C.) by the Second Triumvirate, Cæsar Octavianus, Marcus Antonius, and Marcus Lepidus. The last of the three being considered insignificant, the real struggle lay between Octavian and Antony. The battle of Actium (31 B.C.) decided the supremacy of the former, who was saluted by the Senate as Princeps, Augustus, and Imperator.

Imperial Rome. The period of Augustus's power was a time of peace and reorganisation. Few wars occurred, except such as were necessary to settle the natural boundaries of the Empire—the Rhine, Danube, Black Sea, Euphrates, Africa, and the Atlantic. The supreme power, although nominally shared with the Senate, was in reality in the hands of the emperor. His successors, Tiberius, Caligula, Claudius, and Nero, were hateful and cruel princes. The line of the Julian Dynasty ends with Nero. Then follow Galba, Otho, Vitellius; then three Flavian Emperors, Vespasian, Titus, Domitian. The wise and good Nerva, Trajan, Hadrian, Antoninus Pius, and Marcus Aurelius are followed by the unworthy son of the latter, Commodus. The brilliant conquests of Trajan in Macedonia and Dacia are succeeded by what may be called a period of military anarchy, during which the Prætorian Guard, who may be compared with the Janissaries of Constantinople, set up and deposed emperors at their pleasure. During this time barbarian invasions were frequent. Gibbon dates the beginning of the decline of the Empire from the reign of Commodus. With the accession of Diocletian in A.D. 284 the Empire underwent reorganisation. In order to be able to resist the attacks of the barbarians more successfully, he created two Augustuses and two Cæsars of inferior authority. During the time of Constantine (306-337) Christianity triumphed over Paganism and became the religion of the Empire. Shortly afterwards (330) the seat of empire was transferred to the city built by Constantine upon the Bosphorus, Byzantium, the modern Constantinople. Attacks of the barbarians again became frequent, and although they were often repulsed, the Romans lost ground in Mesopotamia, Armenia, and Dacia, and the Goths



Alinari, Florence, phot.

ROME.

A Capitol. B Temple of Saturn. C Column of Phocas. D Temple of Veaspan. E Arch of Septimius Severus. F Forum. G Appian Way.

gained a footing on Roman soil. After the death of Theodosius (395) the Empire was divided into two parts, an Eastern and a Western Empire. This was a fatal mistake and materially hastened its downfall. Victorious invasions of the barbarians followed in rapid succession—of Alaric in Italy; of the Alani, Suevi, Burgundians, Franks, and others in Africa, Spain, and Gaul, and of the Saxons in Great Britain. The provinces were abandoned one after the other, and in 476 Romulus Augustulus, who, by the irony of fate, bore the names of the founder of the Empire and of the founder of the city, laid down the insignia of Empire before Odoacer, King of Heruli, who claimed from the Emperor of the East sovereignty of Italy, with the title of Imperial Regent. During this period Rome had been taken by Alaric, King of the West Goths, and by Genseric and the Vandals. The submission of Augustulus to Odoacer put an end to the Western Empire; the Eastern lasted nearly 1,000 years longer, until the taking of Constantinople by the Turks in 1453.

In 489 Theodoric, King of the Ostrogoths, overthrew Odoacer, founded a Gothic monarchy and restored considerable prosperity to the state. On his death, in 526, in the reign of Justinian, the Byzantine troops drove the Ostrogoths from Italy, which was then governed for the Eastern Emperors by an exarch, Justinian's general Narses, who dwelt at Ravenna. In 568 the Lombards entered North Italy, founded a kingdom, and threatened the imperial power. As the exarch's influence weakened, the power of the Popes increased, chiefly owing to the rupture between the Eastern and Western Churches, which loosened the bonds between Italy and the Byzantine Empire. Under Leo III., the Iconoclast ("Image-breaker"), Rome and all the clergy arose against the exarch on account of a persecution directed against the worship of images, and about 730 formed an independent republic, governed by the Popes. Being threatened in turn by the Emperors of Constantinople and by the Lombards, Rome demanded aid from the Frankish kings. After the fall of the exarchate and of the kingdom of the Lombards, Rome for some time prospered under the protection of France, having been assisted by Pepin or Pippin, and by Karl the Great or Charlemagne, who was proclaimed emperor at Rome in 800, and the Western Empire was thus in a manner restored. Under Charlemagne's feeble successors the Italian nobles became practically independent sovereigns. On the breaking-up of the Karoling Empire in 887 Italy became a separate kingdom and the bone of contention between various Teutonic invaders; the land was ravaged by Norsemen and Magyars and the power of the Papacy dwindled. At length, in 962, Otto the Great, King of the Germans, re-established order, put down the different factions and was crowned emperor at Rome. From this time forth the sovereign of Italy was a German prince, whose authority varied from time to time. Disturbances, however, still continued and the power of Papacy grew again, as did that of the great Italian cities, which were becoming independent republics. Henry III. forced

Rome to submit to the Emperors, and appointed Popes of his own choice, instead of the office being at the disposal of certain families. In spite of this, however, the Popes soon found themselves obliged to defend the liberty of the Church and Italy against the Emperors, Rome and Milan being the chief centres of resistance. The Popes, while combating the domination of the Emperors, frequently found themselves attacked both by imperial troops and by powerful families, by whom they were expelled from the city or forced to take refuge in flight. After three sieges Henry IV. captured Rome and drove out Hildebrand or Gregory VII. (1084). During the quarrels that arose during the time of Innocent II. (1140) Arnold of Brescia established a republic and a senate at Rome, which lasted for nine years. Gregory IX. fled before Frederick II., who was marching upon the city. In 1281 the nobles, who were at the time masters of the city, refused to admit Pope Martin IV.; in 1309 Clement V., in order to secure the protection of France, changed the seat of the pontifical authority to Avignon; in 1347, taking advantage of the absence of the Popes, Rome again re-established the republic and senate. This state of things did not, however, long continue. In 1354 Cola Rienzi, "the Last of the Tribunes," who meditated nothing less than the reunion of Italy in a single republic, with Rome as centre, having offended his supporters and the people generally, was killed. The Popes did not immediately regain the mastery and did not return until 1377. Even then, up to the 16th century, the great families, notably the Colonnese and Orsini, had more power. The Papal authority was finally consolidated by Alexander VI., Julius II., Leo X. and Clement VII. In the interval Rome had narrowly escaped being taken by assault by Charles VIII., when marching to the conquest of Naples (1495), and was actually captured by the Constable of Bourbon in 1527. When the rule of the Spaniards in Italy had at last re-established order, the position of Rome in the world became altered. Some of the Popes—notably Julius II., Leo X. and Sixtus V.—had materially beautified it, and from that time more than ever the city became the rendezvous of pilgrims, travellers, artists and savants. At the end of the 18th century the tranquillity it enjoyed was interrupted by the French Revolution. Berthier deprived the Pope of Rome and proclaimed a republic (1798); the Peace of Longueville (1801) restored it to Pius VII., but in 1808 Napoleon reunited Rome and the greater part of the States of the Church (the rest being annexed to the Kingdom of Italy) to the French Empire; he declared it the second city of the Empire, made it the capital of the department of the Tiber, gave it a French *préfet* and styled his son King of Rome. The defeat and overthrow of Napoleon brought back the Popes and reinstated them in authority until 1848, but in 1849 Rome became a republic. The Pope was re-established by France in 1850 and French troops were kept in the city to defend him. After 1860 the Italians desired to make Rome the capital of a new kingdom,

and by the convention of 1864, concluded with Napoleon III., the capital was fixed at Florence; but, after the reverses of France in the Franco-German War and the overthrow of Napoleon III., the king of Italy occupied Rome (October, 1870), which thus became the capital of the kingdom of Italy.

Literature. Of literature properly there was little to speak before the 3rd century B.C. In the different branches the representative names whose works, in whole or in part, have come down to us were—in history, Livy, Sallust, Tacitus and Julius Cæsar; in comedy, Plautus and Terence; in poetry, Virgil, Horace, Juvenal, Lucretius, Ovid, Catullus, Propertius, Tibullus, Lucan, Persius; in oratory and *belles lettres*, Cicero, Quintilian, Seneca and the two Plinies. [ITALY.]

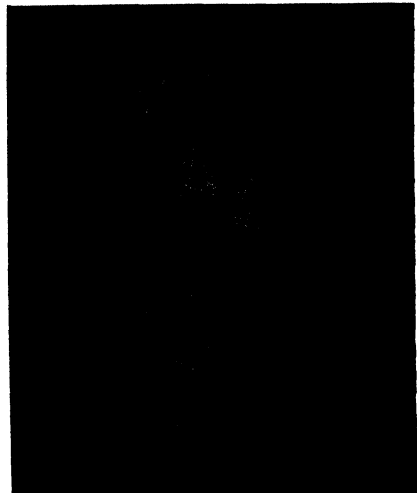
Romford, a town of Essex, England, 6 miles S.W. of Brentwood. In the north aisle of the church of St. Edward the Confessor (rebuilt in 1850) is a monument to Sir Anthony Cooke, preceptor of Edward VI., the Latin inscription of which was written by his learned daughters. The principal buildings are the Corn Exchange, Public Hall and Cottage Hospital. The chief industries are brewing, market gardening and agriculture. Francis Quarles, the poet, was born in the old manor-house of Stewards, near Romford, in 1592. Pop. (1901), 13,656.

Romilly, JOHN, LORD ROMILLY, Master of the Rolls, son of Sir Samuel Romilly, was born in London on January 10th, 1802, and educated at Trinity College, Cambridge. He was called to the bar in 1827 and entered Parliament as member for Bridport in 1832. He became Solicitor-General and was knighted in 1848, and two years later was made Attorney-General. His appointment as Master of the Rolls (1851) was undoubtedly well deserved, and he was the last Master to sit in the House, the right of a seat being afterwards withheld by the Judicature Act, 1873 and 1874. His services were rewarded by a peerage in 1865. He retired in 1873 and died in London on December 23rd, 1874. He superintended the publication of the calendars of State papers.

Romilly, SIR SAMUEL, law reformer, was born in Westminster on March 1st, 1757, of Huguenot descent. He was educated privately and called to the bar in 1783. The friend of Mirabeau and Dumont and a frequent visitor to Paris, he cast in his lot with the leaders of the French Revolution, but the excesses of the movement sobered his enthusiasm. In 1806 he was made Solicitor-General and knighted and became M.P. for Queenborough. Though only little more than a year in office he carried a material amendment of the law of bankruptcy. He afterwards sat for Wareham and Arundel, and in 1818 was returned for Westminster. Addressing himself seriously to the work of law reform, he was instrumental in improving the atrocious system whereby the death penalty and other heavy punishments were inflicted for trivial offences. He was a strenuous opponent of slavery, and an equally enthusiastic advocate of

Roman Catholic emancipation, and constantly denounced the practice of governing by the suspension of the Habeas Corpus Act and the suppression of public meetings. The death of his wife, to whom he was devoted, unhinged his mind and four days afterwards he committed suicide in London on November 2nd, 1818.

Romney, or RUMNEY, GEORGE, painter, was born at Beckside, in Lancashire, on December 28th, 1734. Sir Herbert Maxwell says there is little doubt but that the name is a variant of Romany, a gypsy, and that the Romneys were probably of gypsy descent. He was put to a local school, and at the age of ten his father, a carpenter and farmer, took him into his shop where he acquired considerable manual dexterity, especially in wood-carving. He had also shown such aptitude for drawing and sketching that, when twenty-one years old, he was apprenticed to a peripatetic portrait-painter named Christopher Steele, then living in Kendal. He made rapid progress in his art and in 1756 married



LADY HAMILTON.

(From the painting by Romney in the National Gallery, London.)

Mary Abbot, a most exemplary woman, who might well stand for the modern Griselda, for until he went home to be nursed by her in his final illness, she scarcely saw anything of her husband. Soon afterwards he developed his own style, and in 1762 went to London, where he obtained many commissions. In Italy he spent a couple of years (1773-5), and on his return settled in Cavendish Square. He was recognised as a powerful rival of Reynolds and Gainsborough, and sitters poured in upon him. In 1776 he formed the acquaintance of William Hayley, who acquired singular influence over him and dissuaded him from joining the Royal Academy. In 1782 began his friendship with

Amy Lyon, *alias* Emma Hart, who was afterwards wife of Sir William Hamilton and mistress of Lord Nelson, and whom it is sober truth to say Romney has immortalised in many matchless portraits. In 1787 and later he painted some fanciful compositions for Boydell's Shakespeare Gallery, but this project synchronised with great mental depression, and it may be said almost to date the waning of his powers. He conceived a grandiose scheme for a gallery at Hampstead, upon which he wasted a large sum of money. When he recognised that his health was broken up permanently, a strange instinct took him back to his long-deserted wife in Kendal and there he died on November 15th, 1802. Sir Herbert Maxwell has concisely summed up the strong points in Romney's art—the soundness of his method, the simplicity of his palette, his sense of dignity and grace, the accident of his good fortune in securing a long series of beautiful subjects, his keen eye for womanly loveliness. Judged by the criterion of Christie's, where his canvases invariably command top prices, he must be placed with the foremost masters in British portraiture.

Romney, NEW, a town of Kent, England, 14 miles S.E. of Ashford. It was already a place of some importance at the time of Domesday Book and, although the sea has now retreated for a mile, was formerly one of the Cinque Ports. It was incorporated by Edward III. and received another charter from Elizabeth (1562), as well as one from Charles II. St. Nicholas's Church has a massive western tower showing Norman and Early English work. The chief buildings are the Guildhall, the Assembly Rooms and Southland's Hospital, the last an almshouse founded in 1610 by John Southland. The main industry is connected with the raising of live-stock, ROMNEY MARSH being an extensive tract of rich land embanked from the sea, measuring 12 miles in length by 8 in breadth, and well adapted for the purposes of breeding and fattening sheep, which are raised in vast numbers, much fewer cattle being grazed. At Littlestone-on-Sea is an excellent golf-course, where the Parliamentary handicap is sometimes played. OLD ROMNEY, 3 miles to the west, contains the small but ancient church of St. Clement, with a Decorated west window and Early English font. Pop. (1901), New Romney, 1,328; Old Romney, 137; Romney Marsh, 6,556.

Romsey, a town of Hampshire, England, on a branch of the Test, 7 miles N.W. of Southampton. The abbey church of St. Mary and St. Elfreda, dating from the 10th century, is a cruciform stone building displaying some remarkably fine Norman work and considered to be the best extant type of a Norman conventual church. It consists of a nave with aisles, transepts, choir, ambulatory and central tower. The principal buildings are the new and old town halls and the corn exchange. The industries comprise the building of Berthon collapsible boats, tanning, brewing, milling, ironworks, and the making of preserves and paper. In the marketplace stands a bronze statue of Lord Palmerston, who resided for many years at the adjoining man-

sion of Broadlands, which stands in a park of 400 acres, containing many noble cedars, elms and other trees. Sir William Petty was a native of Romsey. Pop. (1901), 4,365.

Romulus (merely a lengthened form of Romus), mythical king of Rome, and its supposed founder, was, according to the legend, suckled with his brother Remus by a she-wolf and reared by a shepherd. They were said to be sons of Mars, and Romulus was taken up to heaven at his death and became the god Quirinus. The Romulus legend, it has been well said, "is simply the Roman people represented as an individual," in accordance with the universal practice of antiquity to trace the origin of famous communities to heroes from whom the cities derived their name. The original site of Rome was the Palatine Hill, and the date of its foundation, to be precise, was 753 B.C.

Ronda, a town of the province of Malaga Spain, 42 miles N. of Gibraltar. It is grandly situated on both sides of a precipitous ravine, 600 feet deep, at the foot of which runs the Guadiaro. It still preserves a distinctively Moorish appearance, and being of marked salubrity, is a favourite summer resort. The chief buildings are the bull-ring—one of the most commodious in Spain,—the town hall, Casa del Rey Moro, the hospital of Santa Barbara and the casino. The manufactures comprise leather, saddlery, flour, soap, hats and wine. It was taken from the Moors in 1485, and was the birthplace of Vicente Espinel, the romancist and poet. Pop., 20,000.

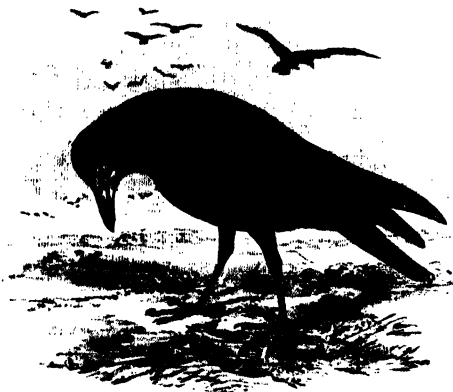
Ronsard, PIERRE, poet, was born at Cousture, in the old district of Bas Vendômois, France, on September 11th, 1524, and was educated privately and at the Collège Royal of Navarre in Paris. He became Court page to James V. of Scotland, when that monarch was in France, and accompanied him to Scotland, where he remained three years. On his return to France he entered the household of the Duc d'Orléans, who sent him on various missions abroad. Becoming deaf, he left the service of the Court and began to write verse, translating the *Plutus* of Aristophanes (1550). In the reigns of Francis I. and Charles IX., who favoured him, he was a prominent figure in literary history. Among his volumes of verse were *Amours de Cassandre* (1552), *Odes* (1553), *Hymnes* (1556), *Franciade* (1572), *Eglogues* (1560), and *Diocours sur les misères du temps* (1563). By his contemporaries Ronsard was acclaimed the "prince of poets," but his muse too exclusively concerned herself with kings, princes, and grand seigneurs ever to become popular. He died in the priory of St. Cosme-en-l'Isle at Tours on December 27th, 1585.

Röntgen, CONRAD WILHELM, physicist, was born at Lennep, Rhenish Prussia, on March 27th, 1845. He was educated at Zürich, where he took the degree of Doctor of Science in 1869. After holding academic appointments, chiefly in physics, at Giessen, Strasburg and elsewhere, he became, in 1885, Professor of Physics and Director of the Laboratory at Würzburg, in Bavaria. Ten years

later (November 8th, 1895) he made his memorable discovery of what he called the X-rays. In 1899 he was called to the chair of physics in Munich. [X-RAYS.]

Rood, a cross or crucifix placed usually and especially in mediæval churches at the entrance to the choir. The rood-screen was a screen separating the choir of a church from the nave and supporting the rood or crucifix. Accordingly in the exterior of the fabric of cruciform churches a spire was built at the crossing, over the entrance to the choir, and this was known as the rood-steeple. One of the most familiar examples is that in Notre Dame, in Paris. The feast of the Finding of the Cross is celebrated on the 3rd of May, which hence is known as Holy Rood or Holy Cross Day.

Book (*Corvus frugilegus*), a well-known bird of the Crow family, common in Europe and some parts of Asia. The adult male is about twenty inches long, with bluish-black plumage, with the



ROOK.

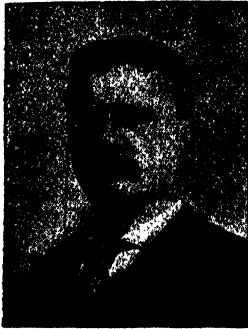
forehead, cheeks and throat bare, and black bill, legs and feet. How the bird gets his bare face is still one of the unsolved problems in ornithology, for the young have the head fully feathered and their visage is only denuded of its plumes in their first winter. This singular feature is peculiar to the rooks, though it is not so pronounced in the Chinese Rook. Albino and pied specimens occur. The rook is a sociable bird, forming large flocks, and nesting by preference near human dwellings, often in squares and gardens, in towns and cities. Rooks are chiefly insectivorous and, though they do some damage to grass and young corn in their search for grubs, are probably to be reckoned among the farmer's friends. Migrants from the Continent arrive in Great Britain in the autumn and there is a return in spring. Occasionally there is "an extensive movement and an apparent immigration of rooks, about November, on the south-west coast of

Ireland. The birds arrive from the west or south-west" (*Field*, March 10th, 1894).

Rooke, SIR GEORGE, admiral, was born at St. Laurence, Canterbury, England, in 1650, and began his service in the Navy by engaging in the second Dutch war. In 1689 he took part in the battle of Bantry Bay and sent a small squadron to the relief of Londonderry, which, however, appears to have rendered only passive assistance, neither succouring the town nor breaking the boom. Promoted rear-admiral of the red in 1690, he participated in the battle of Beachy Head, and in 1692 was promoted vice-admiral of the blue. He was present at the battle of Barfleur and successfully carried out the hazardous operation of burning the French ships in the bay of La Hogue, for which he was knighted. In 1694 he became admiral of the blue, and next year admiral of the white with chief command in the Mediterranean. In 1702 he held the chief command in the expedition against Cadiz, which was only prevented from being fruitless by a lucky chance. The French-Spanish plate fleet had put into Vigo Bay, and Rooke, breking the boom, destroyed or captured all of the enemy's vessels (October 12th). Returning home he took his seat in the House of Commons as member for Portsmouth, and was sworn in of the privy council. In 1704 he was manœuvring in the Mediterranean to prevent the Brest fleet from joining that of Toulon, when, Sir Clowdisley Shovell having arrived with reinforcements, it was decided to make an attempt on Gibraltar, which they captured on July 23rd. On the 13th of August he encountered the French fleet off Malaga and a most obstinate fight ensued, many lives being lost and several vessels disabled. Neither side could claim any substantial gain. This was Rooke's last battle. He died on January 24th, 1709.

Roosevelt, THEODORE, statesman, was born at New York on October 27th, 1858, and educated at Harvard College. Law having no charms for him he turned to a public career and from 1882 to 1884 was a member of the New York Legislature. He afterwards spent three years on his ranche in North Dakota, and in pursuit of big game, his favourite recreation. On his return from this extended holiday he stood as Republican candidate for the Mayoralty of New York, but Tammany and its hirelings defeated him. In 1897 he was appointed Assistant Secretary to the Navy and, foreseeing war with Spain to be the inevitable outcome of the situation in Cuba, worked early and late to organise the naval equipment of the United States. This done, he resigned in order to recruit the regiment of volunteer dragoons which became popularly known as Roosevelt's Rough Riders. He was Lieutenant-Colonel of the regiment which distinguished itself in the brief campaign, and he was promoted Colonel for gallantry in the battle of Las Guasimas. After the war he again recognised the claims of public life and was elected Governor of New York on January 1st, 1899. Against his will he was nominated for the Vice-Presidency of the United States in 1900 and was elected to the post.

On the assassination of William McKinley he succeeded to the Presidency on September 14th, 1901, and was re-elected in November, 1904. His govern-



THEODORE ROOSEVELT.

(Photo : Rockwood.)

ment was characterised by antagonism to every form of corruption in public and civic life, and by denunciation of the conditions of labour at Chicago and elsewhere (1906) and a determination to arrest the growth of Trusts in trade. He has enjoyed considerable reputation as an author, his principal books being *History of the Naval War of 1812* (1882), *Hunting Trips of a Ranchman* (1885), *Life of Gouverneur Morris* (1887), *Ranch Life and Hunting Trail* (1888), *History of New York* (1890), *Winning of the West* (1889-96), *The Wilderness Hunter* (1893), *The Rough Riders* (1899), *Life of Oliver Cromwell* (1900), and *The Strenuous Life* (1900).

Root, in botany, the descending axis of the plant, growing towards the centre of gravity. Its functions are (1) to fix the plant; (2) to absorb liquid nutriment; and (3) to act as a reservoir of nutriment. True roots only occur in plants above the grade of mosses, these more lowly-organised plants having merely cellular rhizoids. Pushing and corroding their way through the more superficial tissues, they are generally surrounded at their base by a torn sheath, or coleorhiza, whilst their apex is protected by the root-cap, or pileorhiza, of dead cells, which have originated from the division of a special region of the dermatogen, known as the calyptragen. Increase in length takes place by division of cells behind this cap. The epidermis is delicate, and without stomates. It may be absorbent, but is generally furnished with numerous unicellular root-hairs, which absorb liquid food, with gases dissolved in the same, by the process known as osmose. Roots may exude acid solvent substances, and are without root-hairs when surrounded by the mycorrhiza, or mycelium of certain fungi. Roots develop mostly in those directions in which moisture occurs, and thus drain the land while appearing to search for water; and two kinds of plants growing in the same soil exercise a selective power by which they take in different substances, and thus differ markedly in the proportions of their chemical constituents. Similarly, the same species grown year after year in any soil will impoverish it of certain substances, thus necessitating manure, or a system of rotation of crops, or fallowing, to allow of natural regeneration of the soil. Internally the root consists generally of a stele, or fibro-vascular axis, consisting of alternating bundles of xylem and phloëm, both

centripetal in their development, surrounded by the pericycle, in which the lateral roots originate, and, in old roots, by a thick impermeable cortex. Roots do not as a rule bear leaves, and, with the exception of the aërial roots of epiphytes, are seldom green. In many cases they will grow equally well under diverse conditions, a young oak, a hyacinth, a willow, or an alder growing equally well, for instance, in water or in soil, whilst some Himalayan rhododendrons, epiphytes in their moist native climate, in England grow well in soil. Roots may be divided into three classes—primary, normal, or tap-roots; secondary or lateral; and adventitious. The primary root is developed directly from part of the embryo, and in its earliest stage is known as the radicle. In palms it only persists for four or five years; but in gymnosperms and dicotyledons it is commonly well developed, and, from its tapering form, is known as a tap-root. In nursery-gardens it is usual to cut off the tap-roots of apple, hawthorn, holly, oak, and other trees, to stimulate the formation of side-roots and facilitate transplanting. The conical root of the carrot and parsnip, the fusiform or spindle-shaped root of the radish, and the napiform root of the turnip are examples of tap-roots enlarged to serve as food-reservoirs. Lateral, or secondary, roots spring from the primary root opposite the xylem bundles, and are consequently in a limited number of vertical rows (orthostichies) down the tap-root. They sometimes reach a great length, those of the ash extending over thirty yards from the stem. They may themselves branch repeatedly, as in the wallflower, until we have the so-called fibrous roots, which superficially resemble clusters of slender unbranched adventitious roots. Secondary roots occasionally bear necklace-like swellings, as in *Pelargonium triste*, when they are known as moniliform. Adventitious roots are those that are borne in no definite order, springing from any part of the plant, as from the base of the embryo in monocotyledons, from bulbs and other underground stems, the nodes of trailing stems and runners, as in the ground-ivy and the strawberry, the climbing stems of ivy, or the bases of cuttings. They are generally clustered and unbranched, but may be fleshy enlarged, as in the nodulose root of the dropwort, *Spiraea Filipendula*, the fasciculate roots of Dahlia, and the tuberculate roots of terrestrial orchids.



TAP-ROOT.

Rope, a cord of considerable thickness or, more technically, a cord of one inch or more in circumference. It is, for the most part, made of twisted hemp or other similar material. The old and tedious process of manufacturing by hand upon a rope-walk has been in great measure superseded by a machine invented by Captain Joseph Huddart (1741-1816) and since improved upon, the advantages of this process being an absolute uniformity of shape

and a more equal tension of the component parts. From 16 to 25 yards of hemp form a strand, three strands a hawser, four strands a shroud, and three shrouds or hawsers a cable. A rope is said to be cable-laid when it is composed of three large strands, each consisting of three smaller ones, and hawser-laid when composed of three strands. A stiff rope, without much capacity for bending, is made by twisting six strands around a seventh, which passes as an axis through the middle. Tarring a rope increases its power of resisting the action of water, but takes away from its strength. Manila hemp makes a very strong rope. Other materials employed in rope-making are steel wire, with or without a hempen core, and cocoa-nut fibre, while in some places bark is used for the purpose.

Rope Gearing, a means of transmitting power between rotating shafts. It is similar to belt gearing, save that hemp (or occasionally cotton) ropes, an inch or more in diameter, are used instead of belts. As the rope rests in a V groove, it is jammed against the sides of the groove with considerable force, and is thus less liable to slip than a flat belt. Ropes of large diameter would not be flexible enough to bend round pulleys of reasonable size, so a number of separate ropes are used whose united strength is sufficient to transmit the requisite force. The grooved wheels and round leather or cat-gut bands used in sewing machines and lathes are simple forms of rope gear.

Rorke's Drift, a ford on a branch of the Tugela, about 50 miles N.E. of Ladysmith, Natal, South Africa, famous for one of the most obstinate defenses on record. After the British camp at Isandula had been annihilated on January 22nd, 1879, the victorious Zulus pressed on to the Drift. This was not in any sense a fortified post, but consisted of a mission church (turned into a store-house) and the missionary's house (now a military hospital). A few hours only had been allowed to the handful of men under Lieutenants Chard and Bromhead to prepare some sort of defence. About half-past four in the afternoon the Zulu hordes advanced in force, only to be driven back time after time by the pitiless fire of the defenders. Nor did the attack cease with daylight, but was continued during the night, greatly assisted by the flames from the hospital which had at last taken fire. At dawn it seemed as if the Zulus were about to sweep down upon the sorely-tried defence, but they thought better of it and suddenly vanished. The British losses were fifteen killed and twelve wounded (two mortally), while of the Zulus 400 fell. The Victoria Cross was awarded to Chard and Bromhead and nine other men. "Rorke's Drift," says the author of *Valour for Victoria*, "is one of the few feats in the world's war history upon which everybody, from Quaker to Jingo, may look with unqualified admiration. It was defence, pure and simple—not defiance. It was magnificent, and yet it wasn't war. It was sheer, downright heroism

in guarding life and honour against overwhelming odds, and its story shall endure for ever."

Rorqual, or **FIN-WHALE**, a whale belonging to the genus *Balænoptera* found in almost all seas. The skin of the throat is closely folded, the dorsal fin is distinct, and the tail greatly compressed before it expands into flukes. Four species occur in British seas. The Blue Whale (*B. sibbaldi*), black above and slate-grey beneath, varied with whitish spots, the largest living animal, may reach a length of 85 feet. These whales feed mainly on small crustaceans, though the Common Rorqual (*B. musculus*) preys upon herrings. The Sulphur-



RORQUAL.

Bottom Whale (*B.*, or *Sibbaldius, sulfuscus*) at times frequents the coasts of California. It glides through the deep with enormous speed, and is recognisable at a distance by the vast quantity of vapour it causes when blowing. Its yellowish belly confers the specific name. One is recorded to have followed a ship for twenty-four days, not even rifle-shots scaring it away. The Lesser Rorqual (*B. rostrata*) seldom exceeds 25 or 30 feet in length, and is found in northern waters, being a regular summer visitor to Norway, and known also as the Cod-whale of Finland. Rorquals yield little blubber and their baleen, or whalebone, is of inferior quality. Consequently they are not much hunted and their numbers tend to increase. They are very migratory, but do not go about in herds, two or three being a usual company, while some are quite solitary.

Rosa, SALVATOR, painter, was born at Aranella, near Naples, Italy, on June 20th, 1615. Developing a taste for drawing he was taught by Francesco Francanzano and also frequently went into the Abruzzi sketching its wild scenery on his own account. Encouraged by Aniello Falcone and Jusepe Ribera to visit Rome, he went to the Eternal City and studied the work especially of Michael Angelo and Titian. Returning to Naples he painted his earliest battle scenes in Falcone's studio and afterwards proceeded to Viterbo, where he decorated the Episcopal Palace for Cardinal Brancaccio and painted for the Church della Morte his fine canvas of "The Incredulity of Thomas." Although his "Prometheus" was also a success, Rosa was still poor, but he suddenly acquired notoriety in 1639 by figuring in the carnival at Rome as a quack doctor. In 1646 he was at Naples again, assisting Masaniello and taking an active part in bounding down the Spanish painters, in

revenge for the tyranny of the triumvirate of whom Ribera was one. Once more in Rome, his pictures of "Human Frailty" and "Fortune Blindly Distributing her Favours" were condemned by the Inquisition and Rosa thought it discreet to retire to Florence, where for several years he played the part of the grand man, painting and writing satires. Returning to Rome in 1663, he resided on Monte Pincio in great style and died there on March 15th, 1673. As a painter he was a pioneer of the romantic school, but his figure subjects often bore a touch of melodrama, and his landscape work is noted for its pronounced chiaroscuro and shows a remarkable preference for the gloomy and rugged in nature. The National Gallery in London contains his "Mercury and the Woodman," and at Hampton Court Palace may be seen his "Moses at the Rock" and "Soldiers Halting."

Rosacea. [ACNE.]

Rosaceæ, a large order of calycifloral dicotyledons, including plants of all sizes and countries, agreeing in having polysymmetric and generally pentamerous flowers, with polypetalous, perigynous corolla, indefinite stamens, and exalbuminous seeds. The fruit is very varied, being either a drupe, an achene, an eterio of achenes or drupels, or a pome. In none of these are the carpels truly fused into a syncarpous fruit. There are ten tribes, sometimes treated as distinct orders:—(1) Pomaceæ, including apples, pears, quince, hawthorn, medlar, etc.; (2) Roseæ, including the roses; (3) Poterieæ, including burnets, ladies-mantle and agrimony; (4) Rubeeæ, including the brambles and raspberries; (5) Potentilleæ, including strawberries and cinquefoils; (6) Spiræeæ, including meadowsweet, dropwort and China-rose; (7) Neuradææ; (8) Amygdalææ, including almonds, peaches, cherries, plums and apricots; (9) Chrysobalanecæ; and (10) Quillajeæ.

Rosaniline. A number of important dye-stuffs are known as rosanilines. They are all derivatives of rosaniline itself, which is a colourless crystalline substance of the composition $C_{20}H_{21}N_3O$. It acts, however, as a strong base, uniting with acids to form salts, which are usually metallic green crystalline compounds, soluble in water, forming, even when very dilute, strongly-coloured solutions. As an example, magenta or fuchsine is the best known, and consists of the chloride of rosaniline. The salts are prepared commercially by treating crude aniline with an oxidising agent, a salt or acid being afterwards added. By substitution of hydrocarbon radicals for some of the hydrogens in the compound many other dyes are formed, *e.g.*, Hoffmann's violet, methyl blue, aniline blue, night green.

Rosario, a town of the province of Santa Fé, Argentine Republic, on the right bank of the Paraná, about 180 miles N.W. of Buenos Aires. It is 60 feet above the river, and has greatly improved since the construction of the railway from Buenos Aires to Tucumán and other important places. The river is navigable for large vessels, and there is regular steam communication with Buenos Aires. The public buildings include the

Palais de Justice, the National College and several educational institutions and hospitals. The industries comprise tanning, brewing and ironfounding. The chief exports are wheat, maize, hides, skins, preserved meat, flour, timber, copper, and wool. Pop., 112,460.

Rosary, a string of beads used by Roman Catholics for numbering the prayers offered at fixed times of the day. Such artificial aids to memory are also in vogue among Mahomedans and Hindus, and it is supposed that the habit of verifying prayers by means of rosaries may have been introduced from the East at the period of the Crusades. The beads on a rosary are divided into decades of Aves, each ten being preceded by a Paternoster bead and followed by a Gloria. What is called the Lesser Rosary contains five decades, that is 50 Aves, three Paternosters and three Glorias or Doxologies. The Rosary of the Blessed Virgin (also called the Dominican Rosary after Saint Dominic who instituted the regular use of it) consists of 15 decades, composed of 150 Aves, 15 Paternosters and 15 Glorias. Each of the decades is further devoted to meditation on a mystery of the life of Jesus—the first five to joyful mysteries like the Annunciation and Nativity, the second five to dolorous mysteries like the Passion, the third five to triumphant mysteries like the Resurrection and Ascension. A festival of the Rosary was established by Gregory XIII. to be held on the first Sunday in October (hence known as Rosary Sunday), for the purpose of commemorating the victory of the Christian forces over the Infidels in the celebrated naval conflict at Lepanto on October 7th, 1571. Roses are often blessed and distributed at the services and the rosary is constantly recited throughout the day. For convenience' sake the Ave beads on a rosary are usually distinctly smaller than the Paternoster beads.

Rosas, JUAN MANUEL IRTIZ DE, statesman, was born, of noble descent, at Buenos Aires on March 30th, 1793. In the movement against centralisation which distinguished the early history of the renunciation of the Spanish yoke, he was a Federalist, but supported President Rodriguez in 1820, and in 1831 was made captain-general, organising the Confederation and helping to subdue the Indian tribes. His unscrupulous methods procured him the position of president, and he then became absolute dictator, embroiling the state with Great Britain, France and Brazil. He tried to force the Plate River States into the Confederation but failed, and was in 1852 defeated at Monte Caseros. He escaped to England, where he died on March 14th, 1877.

Roscus, QUINTUS (died 62 B.C.), the famous Roman actor, whose name has become proverbial, was a friend of Cicero, who defended him in one of his orations. Horace refers to his scholarly acting. He was a comic actor and excelled in high comedy, making a large fortune on the stage. He spared no pains to perfect himself in every part he sustained, and although every point was the result of previous study and rehearsal at home, his

acting was always natural and without mannerism. That his style should have been so spontaneous in view of such careful and elaborate study only shows how consummate must have been his art. Thus it happened with the Romans as with later people that it became the fashion to designate every actor who particularly distinguished himself in his calling as a Roscius. David Garrick was named "The British Roscius," William Henry West Betty (1791-1874) "The Young Roscius," and the name is perpetuated in Charles Churchill's poem of *The Rosciad*.

Roscoe, Sir Henry Enfield, chemist, grandson of William Roscoe, the historian, was born in London on January 7th, 1833, and educated at the High School, Liverpool, University College, London, and Heidelberg University. From 1857 to 1887 he was Professor of Chemistry in Owens College, Manchester, resigning the chair when he was elected M.P. for the Southern Division of Manchester, which he represented from 1885 to 1895. He rendered important service on several Royal Commissions, such as Noxious Vapours, Technical Instruction, the Scottish Universities and Secondary Education. He was elected F.R.S. in 1863, received in 1874 the Royal Medal for his researches on the chemical action of light and on the metal vanadium, was President of the Chemical Society in 1882 and in 1887 President of the British Association for the Advancement of Science. Among his best-known books are *Lessons in Elementary Chemistry* (1870), *Treatise on Chemistry* (1878-89), and *John Dalton* (contributed to the Century Science series of which he was editor).

Roscoe, William, historian, was born in Liverpool, Lancashire, on March 8th, 1753, and was educated at local schools. He was a great reader and, during his apprenticeship to the Law, acquired a knowledge of French and Italian and, in later life, of Greek and other languages. In 1777 he published a poem called *Mount Pleasant* which, like all his work in verse, is undistinguished. His reputation rests upon his *Life of Lorenzo de' Medici* (1796) and *Life and Pontificate of Leo X.* (1805). In 1790 he undertook the management of a private bank, the affairs of which were involved and which ultimately led (1820) to his bankruptcy. He was deeply interested in art and a keen botanist, opened the Botanic Garden at Liverpool (1802) and became Fellow of the Linnean Society (1805). He was elected M.P. for Liverpool in 1806, but his support of the claims of the Roman Catholics to emancipation and his espousal of the Anti-Slavery cause alienated some of his supporters and he lost the seat at the next election. He died in Liverpool on June 30th, 1831.

Roscoff, a town of the department of Finistère, France, on a spit of land projecting into the English Channel, opposite the Isle of Batz, 12 miles N.W. of Morlaix. In the days of the "free traders" it was the place from which most of the contraband cargoes were smuggled or "run" into England. It is the seat of a marine biological laboratory and is historically interesting as the landing-place, in 1548, of Mary Queen of Scots and, in 1746, of Prince

Charlie, a fugitive from Scotland. Fishing, market-gardening and seafaring are the chief industries. Pop., 5,000.

Roscommon, an inland county in the province of Connaught, Ireland, bounded on the N.E. by Leitrim, on the E. by Longford and Westmeath, on the S.E. by King's County, on the S.W. by Galway, and on the N.W. by Mayo and Sligo. It measures 60 miles from north to south and 33 miles from east to west and occupies 950 square miles. The surface is undulating or flat except in the north, where the Curlew and Bawnlieve Mountains rise to 1,200 feet, and Slieve Bawn (857 feet) towards the centre. The chief rivers are the Shannon, with its tributaries the Arigna and Boyle, and the Suck. The Shannon broadens at various points into navigable lakes (Loughs Ree, Forbes, Boderg and Allen) and, besides numerous lakelets, there are Loughs Gara, Key and Arrow towards the north-western border. There is much bog-land and in the peat have been found bones of the extinct Irish Elk (*Cervus megaceros*). The minerals include coal (part of the Connaught field) and iron-ores in the valley of the Arigna. These have been worked from time to time. Sandstone and limestone are quarried and pipe and brick clays occur in several places. The chief crops are oats, rye, potatoes and turnips, and large numbers of cattle and sheep are raised, while dairy-farming is of growing importance. Traces of lake dwellings and other signs of pre-historic man have been discovered. The region was granted by Henry III. to Richard de Burgo, and its present limits were fixed in the reign of Elizabeth. Roscommon is the county town. Pop. (1901), 101,791.

Roscommon, the capital of the county of the same name, Ireland, 18 miles S.E. of Castlereagh. The ivy-clad ruins of the ancient castle are a picturesque feature of the northern end of the town. In 1566 it was captured by the English under Sir Henry Sidney. At a later date, however, it fell again into the hands of the Irish, by whom it was surrendered in 1652 to the Parliamentary forces under Colonel Reynolds. It was afterwards dismantled and gradually decayed. There are a few remains of a Dominican friary founded in the 13th century. The principal modern building is the court-house, a fine structure of the Doric order. The trade is almost wholly confined to the various branches of agriculture for which the county is noted. Pop. (1901), 1,891.

Rose, a genus of shrubs, the type of the order Rosaceæ, including about thirty species, natives of northern temperate regions, chiefly in the Old World, but extending into India, Abyssinia and Mexico, well known both in a wild and in a cultivated state for the beauty of its flowers. Most species bear prickles; the leaves are imparipinnate with stipules adhering to the leaf-stalk; there are normally five petals, which are some shade of red, yellow, or white, and indefinite stamens and carpels. The fruit is a globose or ovoid, concave, fleshy receptacle ("hip") containing the free carpels and crowned by the remains of the leafy sepals.

Botanists have described several hundred species, including nearly twenty British ones, besides an immense number of varieties; but these can be greatly reduced. The best-known British species are *Rosa spinosissima*, the burnet rose, *R. rubiginosa*, the sweet-brier, *R. canina*, the dog-rose, and *R. arvensis*, the white hedge-rose. Among the more important of the cultivated species may be mentioned the Cabbage or Provins (incorrectly called Provence) rose, *R. centifolia*, the Damask rose, *R. damascena*, and *R. Gallica*, from which attar of roses and rose-water are manufactured. The number of garden hybrids and varieties is infinite, and their beauty and fragrance have rendered them the favourites of the poets, by whom the rose is styled the Queen of Flowers. As political emblems, the red rose of Lancaster, the white rose of York, the Tudor rose of England, and in later times the white rose of the Jacobites, have played important parts.

Rosebery, ARCHIBALD PHILIP PRIMROSE, 5TH EARL OF, statesman and author, was born in London on May 7th, 1847. Educated at Eton and Christ Church, Oxford, he entered the House of Lords in 1868, succeeding his grandfather, the fourth earl. He made his first speech in 1871, and, taking a great interest in social subjects, sat on several committees formed to investigate the condition of the people. In 1874 he was president at the Glasgow meeting of the Social Science Congress. In 1878 he became Lord Rector of Aberdeen University, in 1880 of Edinburgh University, and in 1899 of Glasgow University. In 1881 he entered the Liberal Ministry as Under Secretary of the Home Department. In 1885 he was, for a few months, Lord Privy Seal and First Commissioner of Works, and in 1886 was made Secretary for Foreign Affairs, a post which he filled for a second time with general acceptance from 1892 to 1894, resigning it in March of the latter year to take up the Premiership in succession to W. E. Gladstone, when he combined the offices of First Lord of the Treasury and Lord President of the Council. When the London County Council was established in 1888, he was elected a member and became its first chairman. The Liberal Party was defeated at the General Election of 1895, and in 1896 Lord Rosebery, finding himself in disagreement with a large section of the party on the Eastern question and also out of touch with them on the subject of Home Rule, resigned the leadership and retired from political life. From time to time, however, he appeared at Liberal meetings and attempts were made periodically to induce him to abandon the "lonely furrow" he was ploughing and resume his place in the counsels of the party. He has made several incursions into literature, in which he has always been keenly interested since the days when he owned the old weekly *Examiner*. His chief books are *William Pitt* (1891), *Sir Robert Peel* (1899), *Napoleon* (1900) and *Lord Randolph Churchill* (1906), a delightful and characteristic study of his old friend. One of his hobbies is the collection of MSS. of Robert Burns. As an orator he is extremely polished and his exquisite humour makes

him the first of after-dinner speakers. On the 20th of March, 1878, he married Hannah (d. November 19th, 1890), the only daughter of Baron Meyer Amschel de Rothschild. He is an ardent sportsman and won the Derby in 1894 with "Ladas," in 1895 with "Sir Visto" and in 1905 with "Cicero" (in the record time of 2 minutes 39½ seconds). Lord Rosebery is Knight of the orders of the Thistle and the Garter.

Rosemary, a corruption (altered from "rosemarine" to "rosemary" in simulation of *rosa Maria*, "Mary's rose") of the Latin name *Rosmarinus* ("sea dew"), applied to a genus of Labiata, containing only a single species, *R. officinalis*, from its glaucous surface. It is a native of Southern Europe, and has narrow revolute leaves, a purplish bilabiate calyx, pale blue corolla, and only two stamens. Its fragrant, slightly-stimulant character caused it to be formerly considered good for headache or failing memory, its latter attribute being in her mind when distraught Ophelia gave it "for remembrance." It enters into the composition of Hungary-water, eau-de-Cologne, and other perfumes, and its essential oil renders it useful as a lotion in cases of baldness. It is largely produced in the island of Lesina, in Dalmatia, and exported from Trieste. One hundredweight of the flower-heads yields 24 oz. of oil. It is adulterated with turpentine.

Roseola, or ROSE RASH, an eruption of small, slightly-raised, rose-coloured spots, with slight fever and sore throat. It may be mistaken at first for measles, but is not infectious. There is no cold in the head, as in measles, nor is the fever high enough for scarlatina. It usually occurs in infants, children and young persons, and runs its course in from one day to four or five days. A few warm baths, mild aperients, light food, attention to digestion and tonics comprise all the treatment necessary.

Roses, WARS OF THE. The civil war in England during the 15th century is commonly so-called from the fact that the Yorkists assumed a white rose for their badge and the Lancastrians a red rose. It arose out of the rival claims of the Houses of Lancaster and York to the throne, and extended over a period of thirty years, in which, however, there were long intervals of peace. Both families were descended from sons of Edward III. York had strict hereditary right, Lancaster both possession and parliamentary title. Edward III. was succeeded by his grandson, Richard II., son of the Black Prince. On the death of his uncle, John of Gaunt, Duke of Lancaster, fourth son of Edward, Richard seized his uncle's estates in the absence of his cousin, Henry, Duke of Hereford, Gaunt's son, whom he had banished. Henry, called Bolingbroke from the place of his birth in Lincolnshire (1367), had the sympathy of the people, whom Richard had alienated. Henry was urged to take advantage of Richard's absence in Ireland, where the king was completing the work of subjugation, and with a small retinue he landed at Ravenspur, in Yorkshire, on July 4th, 1399, and was

immediately joined by the heads of the great houses of Percy and Neville. He entered London in triumph, Richard was deposed by Parliament, and Bolingbroke, having claimed the crown, became Henry IV. He was succeeded by his son Henry V. and his grandson Henry VI. Through the weakness of the policy of the last-named king, the unpopularity of his marriage with Margaret of Anjou, and the loss of France, the people became estranged from the dynasty. Richard, Duke of York, heir to Edward III. through his third son Lionel, Duke of Clarence, began to advance his claims to the throne. He was closely allied to the Earls of Westmoreland, Salisbury and Warwick, afterwards known as the King-maker. But the birth of a son to Henry, in 1453, removed his hope of a peaceful succession. In 1454 the king became seriously ill, and York was appointed Protector. On his recovery York's authority terminated; he and his friends knew they were out of favour, and took up arms against his rival the Duke of Somerset, whom he vanquished and slew at the first battle of St. Albans on May 23rd, 1455. The king again fell ill, and York was once more nominated as Protector, but Henry recovered in 1456. A formal reconciliation of the contending factions took place in February, 1458, but after the victory of the Yorkist Earl of Salisbury at Bloreheath (September, 1459) and the encounter with the king's army at Ludlow, when the Yorkists fled, leaving their banners on the field, the Duke and his party were attainted. At the battle of Northampton on July 10th, 1460, Henry was taken prisoner and, seated on the throne in the House of Lords, the Duke of York advanced his claim by lineal descent. A compromise was arrived at. It was agreed that the king should keep the crown during his lifetime and that Duke Richard should be recognised as heir-apparent. Queen Margaret would not submit to the surrender of her son's rights, and her adherents defeated the Yorkists at Wakefield on December 30th, 1460. The Duke was slain, his head being stuck upon the walls of York crowned with a paper crown. His claims were continued by his eldest son, Edward, Earl of March, who gained a decisive victory at Mortimer's Cross on February 2nd, 1461, when Sir Owen Tudor was taken prisoner and beheaded. On February 17th the queen's party defeated the Earl of Warwick at St. Albans, but she found it prudent to withdraw to the north when the Earl of March entered London and with acclamations was, on March 3rd, proclaimed king by the title of Edward IV. After the battles of Ferrybridge (March 27th) and Towton (March 29th) King Henry and his queen sought refuge in Scotland, and Edward was crowned in London on June 28th. Margaret then sought help in Flanders and Scotland, but her followers were routed at Hedgeley Moor on April 25th, 1464, and at Hexham on May 15th. Through his marriage with Elizabeth Woodville, Edward

estranged many of his supporters and, by the alliance of Warwick with Margaret's party, was driven to flee from England in 1470. Henry was restored, but Edward returned within six months, and his crown was secured by the defeat and death of



ROSETTA : GATE OF THE TOWN.

Warwick at the battle of Barnet on April 14th, 1471, and the defeat of Queen Margaret at Tewkesbury (May 4th), when her son, Prince Edward, was murdered. King Henry died on the night of his arrival in the Tower of London, and so the legitimate male line of Lancaster became extinct. The hopes of the Lancastrians centred in the descendants of the Duke of Somerset, the legitimated son of John of Gaunt. His representative was Margaret, Countess of Richmond, whose son, Henry Tudor, Earl of Richmond, was regarded as heir. His father's mother was Katherine of France, widow of Henry V., who afterwards married Owen Tudor, a Welshman (beheaded 1461), in whose descendants the crown passed to the ancient British stock. Edward IV. now reigned undisturbed, but the validity of his marriage was held to be doubtful. When he died, his son Edward was a minor, and Richard, Duke of Gloucester, youngest son of Richard, Duke of York, was declared Protector. An irregular election called upon Gloucester to assume the crown (July 6th, 1483), and both Edward V. and his brother were foully murdered in London Tower. Richard III.'s right was at once challenged by Henry of Richmond, who overthrew him at Bosworth Field on August 22nd, 1485, and was saluted on the field as Henry VII. His title was weak and he wished to owe nothing to the rights of Elizabeth, daughter of Edward IV. He reigned by an election which followed his coronation, and the next year married Elizabeth, who represented the regular succession of the House of York. The birth of their son Arthur, 1486, seemingly placed the succession on sure ground, as it marked the blending of the rival roses. For a while Henry was troubled with the Yorkist impostors

Lambert Simnel and Perkin Warbeck, but for the last ten years of his life he reigned undisturbed. The effect of these wars was far-reaching. The Church was weakened, the old nobility was almost destroyed, and their successors, owing their creation to the crown, prepared the way for the absolutism of the Tudors. Not until after the horrors of another civil conflict did the House of Commons become the ruling factor in the nation.

Rosetta, a town of Lower Egypt, Africa, on the western arm of the Nile, 6 miles from the Mediterranean and 35 miles N.E. of Alexandria. It is famous as the place near which (4 miles to the north really) a French officer named Bousard found, in 1739, a basalt pillar containing a decree of Ptolemy V. Epiphanes. The importance of this event consisted in the fact that the Rosetta Stone, as it came to be called, afforded the key to the decipherment of the hieroglyphic characters of the ancient monuments of Egypt. The Rosetta Stone is now in the British Museum.

Rosewood, valuable furniture woods of a dark reddish colour, and of various origins. They are mostly the product of species of the leguminous genus *Dalbergia*. *D. nigra*, of Brazil, is the most esteemed, and *D. latifolia* and *D. sissooides* are the sources of Indian rosewood. Inferior sorts are obtained from the Jacaranda trees, species of *Machærium*, in Brazil. Burnese rosewood is that of *Pterocarpus indicus* (the "Padouk"), and African rosewood that of *P. erinaceus*. All are leguminous. Some kinds when freshly cut give off a faint odour resembling rose scent and from this the timber derives its popular name. It was once in great favour for the frames of steel engravings and is still largely used for pianoforte cases and drawing-room suites.

Rosicrucians. [SECRET SOCIETIES.]

Roslin, a village of Midlothian, Scotland, on the North Esk, 6½ miles S. of Edinburgh. The Castle, occupying a commanding position on the verge of the finely-wooded glen, was the seat of the St. Clairs (or Sinclairs), Earls of Orkney and afterwards of Caithness, was founded in the 14th century, and is now a substantial but unpicturesque ruin. The Chapel, a perfect gem of Gothic architecture, dates from 1446, being founded by William, 1st Earl of Caithness. It was originally designed as the choir of a projected collegiate church, which made no further progress. A Revolutionary mob did considerable damage to the exterior in 1688, but luckily was prevented from desecrating the interior to a serious extent. The edifice was restored by the 3rd Earl of Rosslyn and has been kept in repair by his successors. The exquisite beauty of the details, including the famous 'Prentice

Pillar, attracts visitors from all parts of the globe. On Roslin Moor the English were thrice defeated on one day (February 24th, 1302). It was at Roslin Inn that Robert Burns, during a walk with Alexander Nasmyth, the painter of the celebrated portrait of the poet, inscribed on a platter the epigram beginning, "My blessings on ye, honest wife." The industries are carpet-weaving and gunpowder-making. There is a romantic walk through the glen by the side of the Esk to William Drummond's mansion of Hawthornden. Pop., 1,129.

Rosmini, CARLO DE, historian and biographer, was born at Roveredo, 30 miles N. of Verona, in Tirol, in 1758. Being destined by his parents for the law, he studied at Innsbrück, but on his return to his native place was induced to betake himself to literature, his moderate fortune enabling him to devote himself to a literary career without inquietude. In 1803 he went to Milan, where he remained till his death in 1827. He wrote a considerable number of works, all of which show erudition, accuracy and impartiality, the most important of them being a *Life of Ovid* (1789), a *Life of Seneca* (1795), a *Life of Vittorio da Feltré* (1801), a *Life of Francesco Filelfo* (1808), a *Life of Giovanni Giacomo Trivulzio* (1815), and a *History of Milan*, in 4 volumes (1820).

Ross, a town of Herefordshire, England, on the left bank of the Wye, 14 miles S.E. of Hereford. The town is famous in Alexander Pope's eulogy of John Kyrie (1637-1724), "The Man of Ross," a philanthropic native whose other hobby besides



INTERIOR OF ROSLIN CHAPEL.
(Photo: A. Inglis, Edinburgh.)

charity was landscape-gardening, of which he gave evidence not only in the avenues of noble elms he planted, but also in the pleasure ground of The Prospect, commanding a fine view of the enchanting scenery. His name lives to-day in that of the K-rila

Society, founded by Octavia and Miranda Hill with the object of brightening the lives of the poor by various forms of entertainment. In the chancel of the church of St. Mary the Virgin, a building of the Decorated and Perpendicular styles, the Man of Ross was buried. The spire referred to by Pope was struck by lightning in 1852, but rebuilt. The other structures include the Corn Exchange in the Italian style, the Elizabethan house occupied by John Kyrle (which has, however, been somewhat altered), the quaint Market House supported on pillars, the Free Library and the Bluecoat School, founded in 1709. The industries comprise machinery works, brewing, boot-making, milling, ironfounding and the making of agricultural implements. Pop. (1901), 3,303.

Ross and Cromarty, a county in the north of Scotland, bounded on the N. by Sutherlandshire and Dornoch Firth, on the E. by the North Sea, on the S. by Moray Firth, Beaulie Firth and Inverness-shire and on the W. by the Minch (an arm of the Atlantic). It includes also the Lewis portion of the island of Lewis and Harris of the Outer Hebrides. It occupies an area of 3,200 square miles, being the third largest shire in Scotland. Until 1891, when they were amalgamated, Cromarty (which consisted of the Black Isle and detached portions distributed throughout Ross) and Ross were separate counties. The surface is mostly extremely rugged, the principal heights including Carn Eige (3,877 feet), Mam Soul (3,862), An Riabhachan (3,696), Sgurr Mor (3,657), Ben Dearg (3,517), Ben More (3,505), Ben Wyvis (3,429) and Ben Attow (3,383). The chief rivers are the Oykel, Conon and Carron. The Atlantic coast is indented to an extreme degree, the saltwater lochs including Enard, Broom, Gruinard, Ewe, Gair, Torridon, Carron and Alsh. Loch Maree, a noble freshwater lake, is second only to Loch Lomond in respect of size and grandeur. On the eastern coasts the leading indentations are the firths of Dornoch, Cromarty and Beaulie and Nigg Bay. Eastern Ross (especially the Black Isle) is fertile, oats, barley and wheat being the principal crops. Cattle and sheep are raised in great numbers, the carcasses from the Black Isle being among the very best in quality entering the London market. Distilling, agriculture and the salmon and deep-sea fisheries are the only considerable industries, but some woollens are woven in the villages and in the Lewis. The principal towns are Dingwall, the county town, Inverness, Cromarty, and Stornoway, one of the most important of Scottish fishing stations. Pop. (1901), 76,420.

Ross, Sir John, Arctic explorer, was born at Inch, in Wigtownshire, on June 24th, 1777, and entered the navy while a boy. In 1818 he went on his first Arctic expedition with Lieutenant (afterwards Sir) William Edward Parry, and published his *Voyage of Discovery* in 1819. His *Narrative of a Second Voyage* came out in 1835, after his return from the expedition commanded by himself. He made some important discoveries, and was rewarded by a knighthood (1834) and the consular appointment to Stockholm, which he held from 1839 to 1846.

Having been denied the opportunity (on account of age) to take part in the official Franklin Relief Expedition, he undertook a voyage in the *Felix* in 1850 but without result. This was his last voyage. He died in London on August 30th, 1856. His nephew, **SIR JAMES CLARK ROSS** (1800-62), acquired great reputation as an Arctic explorer, being the discoverer of the magnetic pole on June 1st, 1831. In 1839 he commanded the *Erebus* and *Terror* Expedition to the Antarctic Ocean. The vessels returned to England in 1843, only one man having been lost through illness during the four years' absence. Ross was knighted in 1843 and in 1847 published his *Voyage of Discovery in the Southern and Antarctic Seas*.

Rosse, William Parsons, 3rd Earl of, astronomer, was born at York, England, on June 17th, 1800, and educated at Trinity College, Dublin, and Magdalen College, Oxford. From 1823 to 1834, while still Lord Oxmantown, he was four times elected M.P. for King's County, Ireland, but retired from active politics to devote himself to the pursuit of astronomy and especially to the perfection of instruments. Having succeeded in casting specula of 6-feet diameter, he next constructed the great reflecting telescope which made him famous. All his operations, of whatever character, were carried out at Birr Castle, Parsonstown, and he found all his workmen in the locality. In 1845 he was able to begin observations by its means, giving particular attention to the study of nebulae, many of which were thus resolved into stars, and of the moon. He succeeded to the peerage in 1841 and died at Monkstown, Ireland, on October 31st, 1867. He was President of the Royal Society from 1849 to 1854.

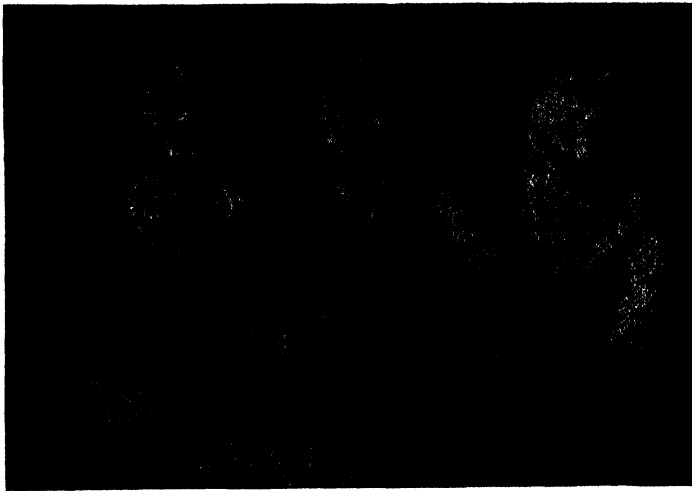
Rossetti, Christina Georgina, poetess, daughter of Gabriele Rossetti, the Italian patriot and scholar, was born in London on December 5th, 1830, and was educated privately. She began to write verse at an early age and contributed poems of great beauty to the Pre-Raphaelite magazine called *The Germ* (1850). During her father's illness she became a teacher of Italian. Her first published volume, *Goblin Market* (1862), was also her best. It was followed by *The Prince's Progress* (1866), *Commonplace* (prose stories, 1870), *Sing Song* (nursery rhymes, 1872), and *A Pageant* (1881), in addition to numerous works of devotional literature, such as *Time Flies* (1885) and *The Face of the Deep* (1892), a commentary on the Apocalypse. She was an invalid for many years and died in London on December 29th, 1894. Her sister **MARIA FRANCESCA ROSSETTI** (1827-76), who possessed a great gift for teaching, was also of a highly devotional temperament, and published in 1871 an important Dante manual entitled *A Shadow of Dante: being an Essay towards Studying Himself, his World and his Pilgrimage*.

Rossetti, Gabriel Charles Dante, commonly called **DANTE GABRIEL ROSSETTI**, poet and painter, was born in London, the son of the Italian patriot and the brother of the preceding, on May 12th, 1828. He was first sent to a private school,

and afterwards to King's College, where he remained from 1835 to 1843. He had written verse from a tender age, and his first poem was privately printed in 1842. Having a taste for art, he was sent to F. S. Cary's drawing-school in Bloomsbury, and then to the Royal Academy schools (1846). After studying under Ford Madox Brown for a time, he took a studio along with Holman Hunt. In 1849 his first picture was exhibited, and about the same date the famous Pre-Raphaelite Brotherhood was founded by Rossetti and a group of gifted young artists. They had a periodical called *The Germ*, to which he largely contributed, and which only lived for a few months. In 1860 Rossetti married Elizabeth Eleanor Siddall, who had sat for some of his wonderful portraits, and her death in 1862 greatly affected him. He buried his manuscript poems

Revenue for nearly half a century, wrote art criticism for the *Spectator* and other newspapers, translated Dante, was an assiduous writer on the life and work of Dante Gabriel Rossetti, and published his *Reminiscences* in 1906.

Rossetti, GABRIELE, patriot and scholar, son of Nicola Rossetti, was born at Vasto in the kingdom of Naples, on February 28th, 1783. Educated at the University of Naples, a clever draughtsman and a ready writer of verse, his youth was passed in an atmosphere of political unrest. He was appointed Curator of Ancient Bronzes in the Museum at Naples and became librettist to the Opera House. Rossetti took part in extorting from Ferdinand the constitution of 1820. In the following year the king treacherously abrogated the constitution with



ROSA TRIPLEX.

(From the painting by Dante Gabriel Rossetti in the National Gallery of British Art, London.)

with her, but his friends afterwards (1869) induced him to exhume them. Previously, in 1861, he had published a volume of fine translations from the Italian. In 1870 his *Poems* appeared, and in 1881 his *Ballads and Sonnets*. He died at Birchington-on-Sea, Kent, on April 10th, 1882. He has written some beautiful ballads, and certainly his magnificent sonnets are among the noblest in the language. As a painter he was distinguished for his power in design, his fine sense of colour and depth of feeling, but his drawing was at times very weak and mannered. Among his best-known works of art are "Dante's Dream" (1869-71), in the Walker Gallery, Liverpool, "Ecce Ancilla Domini" (1850), in the Tate Gallery, London, "Beata Beatrix," "Monna Vanna," "Venus Verticordia," "Rosa Triplex," and "Mrs. William Morris." His brother WILLIAM MICHAEL ROSSETTI (born on September 25th, 1829), was a member of the staff of the Inland

the help of an Austrian army. Sir Graham Moore, the British admiral, was lying with his fleet in the bay and his wife, an admirer of Rossetti's patriotic hymns, prevailed upon him to endeavour to save the poet. Sir Graham with an officer sought out his place of concealment and shipped him off to Malta disguised in a British uniform. There he gained the friendship of John Hookham Frere, the governor, by whose introductions he established himself in London in 1824. In 1826 he married Frances Polidori, and in 1831 was appointed Professor of Italian in King's College. A man of high character and an ardent patriot, whose house became the resort of fellow refugees, he did not live to see the consummation of the movement for which he suffered. He died in London on April 26th, 1854. A medal was struck in his honour and his memory is cherished in his native town, where his birthplace has been made public property and the chief

square and a theatre have been named after him. His many published works include a commentary on the *Divina Commedia*, in which he contends that its inner meaning is political and anti-papal; and *La Beatrice di Dante*, wherein he maintains that Beatrice is a symbolic being, not a real woman, a view which Coleridge said he "pushed beyond all bounds of common-sense." Rossetti is probably best known in England as the father of a remarkable family each of whom attained intellectual eminence, namely, Maria Francesca, devotional writer, Gabriel Charles Dante, poet and painter, Christina Georgina the poetess, and William Michael Rossetti, the art critic.

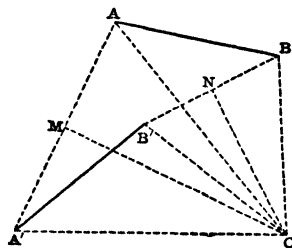
Rossini, GIOACCHINO ANTONIO, composer, was born at Pesaro, Italy, on February 29th, 1792, and began his musical career as a chorister. His intense love of music led to his unremitting study of it, and he produced at an early age some very creditable works. In 1813 he brought out his *Tancredi* at Venice, and this opera was received with tremendous enthusiasm. Three years later appeared in Rome his *Il Barbiere di Siviglia*, also a great success, though hissed on its first performance. Other brilliant works followed in rapid succession, including *Otello* (1816), *La Cenerentola* (1817), *La Gazza Ladra* (1817), *Mose in Egitto* (1818), *La Donna del Lago* (1819), *Semiramide* (1823) and *Guillaume Tell* (1829), the last his masterpiece. In 1821 he married, and left Italy in 1823 to go to Paris and London. He became director of the Opera in Paris, but neglected his duties and lost the post. He returned to Italy in 1836, and settled in his native place, but left it finally in 1855 for Paris, where he died on November 13th, 1868. In addition to his operas Rossini is celebrated for the haunting melody of his *Stabat Mater* and his *Petite Messe Solennelle*.

Rostock, a town in the Grand Duchy of Mecklenburg-Schwerin, Germany, in a flat district, on the left bank of the Warnow, a navigable river which forms an inland lake communicating with the Baltic, from which it is 7 miles distant, 45 miles N.E. of Schwerin. It consists of Old, New, and Middle Town, the first of which is irregularly built and the middle well built. Notable features are the Grand Duke's palace, the Stadthaus with its seven towers, the imposing 15th-century church of St. Mary, in which Grotius was buried in 1645 (though his remains were taken later to Delft), and St. Peter's church, whose tower (433 feet high) is a conspicuous landmark to mariners. The university was founded in 1418. The chief manufactures are machinery, sugar, chemicals, leather, cotton, tobacco and paper, besides brewing, distilling, and shipbuilding. There is a large trade, especially with Great Britain, and the fisheries are important. Corn, wool, flax, butter, and salt provisions are exported. Rostock, whose port is at Warnemünde, at the river's mouth, was a member of the Hanseatic League. Of Field-Marshal Blücher, who was born here in 1742, there is a fine statue in Blücher Platz. Pop. (1900), 54,713.

Rostoff, a town in the province of the Don Cossacks, Russia, on the Don, about 25 miles from

its mouth in the Bay of Taganrog, the north-eastern area of the Sea of Azoff. It has grown with immense rapidity since the development of the agricultural and industrial resources of South Russia and the Caucasus, for which vast regions it serves as the chief emporium of trade. The principal exports are wheat, rye, flax, vegetable oils, wool and caviare, and the imports are considerable. Besides iron foundries, shipbuilding, sawmills and distilleries, the manufactures include machinery, tobacco, soap, paper, rope and bells. Pop., 119,889.

Rotation of a body takes place when any definite straight line in the body does not continue to remain parallel to itself in the different positions it assumes. Suppose the body moves so that the line AB in it ultimately takes up the position $A'B'$. A point, O , may be found about which the line may be considered to have rotated. Join AA' and at the centre of AA' erect a perpendicular MO . Similarly erect NO perpendicular to N , the middle point of BB' . The two perpendiculars meet at O . It can be seen at once that the triangles OAB and $OA'B'$ are equal in all respects; \therefore the angle $A'O B' =$ the angle $A O B$; \therefore the angle $A'O A =$ the angle $B'O B$. Hence the point A has rotated through the same angle as the point B , so the whole line may be considered to have rotated about the point O . If MO is parallel to NO , O is at infinity, and the line AB has merely moved parallel to itself, or there has been a motion of translation only. Hence the translation of a line may be considered as a rotation about a point infinitely far off. If a body be constrained to rotate about several axes which meet in a point, the result is a rotation about one axis, which is, as it were, equivalent to a resultant of the other axes, and is thus found:—Lines are drawn representing the component axes in direction, and the lengths of these lines are made proportional to the angular velocities about these axes. If there are only two, the construction is the same as that for the parallelogram of velocities (q.v.), the diagonal representing in direction the resultant axis, and in length the angular velocity about this axis. A third rotation can be compounded with



this diagonal, and so on for any number. If a body move in any plane curve, its motion can be considered as the result of an infinite number of small displacements, and at any moment one row of points is quite still. It is about this momentarily

fixed line that the body may be considered to be rotating, and this line is therefore known as the instantaneous axis of rotation. This axis traces out two curved surfaces, one in space and the other in the moving body, and the whole motion of the body can be obtained by the rolling of one of these curves upon the other. As an example of this, we have the cycloid obtained by the rolling of a circle on a line—the instantaneous axis—now reduced to a point or instantaneous centre, being the point of contact of circle and line. Obviously the two curves it traces out are the circle on the body and the line in space. If a rigid body move in any direction whatever, at any moment there is in it a row of points which is undergoing no motion except a translation along its own line; if the motion is somewhat limited by having one point in the body quite fixed, then at any moment there is a row of points remaining absolutely still and forming an instantaneous axis. This axis describes two cones (whose section is by no means limited to a circle), one in the body and one in space. Hence the motion of the body may be regarded as the result of the rolling of one of these cones on the other.

Rotche (*Mergulus alle*), an Arctic bird of the Auk family. It is about nine inches long, black above and white beneath, and visits the northern coasts of Great Britain in winter. They may be seen far from land, cresting the billows or diving for food. They nest in communities, Spitzbergen and Nova Zembla being favourite breeding-places, and are common in Greenland. Their flight is hurried and, while flying, they dive without interrupting the action of their wings and emerge from beneath the surface flying, while they swim with the tail rather deep in the water.

Rothe, RICHARD, theologian, was born at Posen, in Prussia, on January 28th, 1799, and studied at Heidelberg chiefly. In 1819 he went to Berlin, and became connected with Neander. He was appointed (1823) preacher to the Prussian Embassy at Rome, remaining there five years, during which he formed an intimate friendship with Bunsen. In 1828 he was made professor of theology at Wittenberg, and after nine years proceeded to Heidelberg in the same capacity. In 1849, just after the publication of his notable work, *Theologische Ethik*, in three volumes, he went to Bonn, but in 1854 returned to Heidelberg, where he died on August 20th, 1867. Rothe was a deep thinker and exercised a profound influence on contemporary theology. Beginning with a bent towards Mysticism, he then passed to Pietism, emerging finally as the advocate of an ever-increasing liberalism. Besides the work already named, he wrote (amongst others) *Anfänge der Christlichen Kirche* (1837), *Zur Dogmatik* (1863), and *Stille Stunden* (1872, posthumously).

Rothenstein, WILLIAM, portrait and genre painter, was born at Bradford in Yorkshire on January 29th, 1872. He studied at the Slade School of Art under Alphonse Legros and in Paris under Benjamin Constant, Jules Lefebvre and

Doucet. In Paris he moved in a brilliant circle, counting among his friends such men as Rodin, Whistler, Degas, Fantin-Latour, Alfred Stevens, Paul Verlaine and Charles Conder, who was a fellow-student of his. Whilst in Paris he sketched most of the famous Frenchmen of the time, including Edmond de Goncourt, Verlaine, Anatole France, Zola, Daudet, Fantin-Latour and Rodin. He also made drawings of the famous actors the two Coquelins in their various "parts." He exhibited in the first exhibition of the Société des Beaux Arts at the Champ de Mars. He returned to London in 1893, when he exhibited at the New English Art Club, afterwards becoming one of its most prominent members. In 1893 he drew twenty-four lithographic portraits of "Oxford Characters" which were published by John Lane. In 1897-8 he published another series of twenty-four lithograph drawings of famous Englishmen, entitled "English Portraits." These were followed by other series as "Manchester Portraits," "Liber Junium" and a "French Set." In 1898 were issued three drawings of Paul Verlaine. In the following year he wrote an admirable monograph on Goya. His later and more famous pictures depicted scenes of Jewish life of to-day; chiefly in the synagogue. Of these the best known are "A Dissertation on the Talmud" and "In the Spitalfields Synagogue," now to be seen in the Permanent Collection in the National Gallery at Dublin. His picture "Aliens at Prayer," shown in the Exhibition of Independent Art at Agnew's Gallery in 1906, was purchased by the Melbourne Art Gallery, after being unsuccessfully recommended for purchase by the sub-committee of the Chantrey Fund. His picture illustrative of a scene in Ibsen's *Doll's House* was one of the British Collection at the St. Louis Exhibition of 1904, having previously received a silver medal at the Paris Salon. Other examples of his work to be seen at public galleries are:—"The Sculptor" (Albert Toft) in the Kunsthalle at Bremen and the "Portrait of a Young Man" in the Walker Art Gallery at Liverpool. The Luxembourg in Paris possesses prints of his lithographic portraits of Rodin, Fantin-Latour and Coquelin, whilst the British Museum and the museums at Berlin and Dresden also possess fine examples of his lithograph work. Most notable among his portraits may be mentioned those of Dr. Walker, Highmaster of St. Paul's School, Francis Darwin, painted for the Laboratory at Cambridge, Dr. Furnivall, now in Trinity Hall, Cambridge; the Bursar of Magdalen College, Oxford, and Miss Irene Vanbrugh as "Miss Trelawny." Rothenstein has succeeded beyond measure in giving practical effect to his opinions that art should express a definite view of life, and that art which possesses human interest is greater than that which is merely æsthetic. His work is remarkable for its insight into character, its sincerity and its unforced dramatic feeling.

Rotherham, a town of Yorkshire, England, on the Rother at its confluence with the Don, 6 miles N.E. of Sheffield. Edward I. granted it a market charter and Mary Queen of Scots and Charles I.

both passed through the town as prisoners. In the Civil War it sided with the Roundheads, was captured by the Royalists in 1643, but next year surrendered to the Parliamentarians after the battle of Marston Moor. It was incorporated in 1871. All Saints' Church (restored 1874-5), occupying the site of a small cruciform structure of the Norman period, is a grand Perpendicular edifice dating from the reign of Edward IV. Other prominent buildings include the grammar school, founded in 1483 by Thomas de Rotherham, Archbishop of York; the council hall; the courthouse; the hospital in the Tudor style; the free library and St. George's Hall, both in the Elizabethan; the Masonic hall; the mechanics' institute and the market hall. In addition to large iron and steel foundries, the manufactures comprise railway waggons and wheels, general forgings, glass, chemicals, bricks, earthenware, pottery, pipeclay, soap, starch and beer. Rotherham Park, of 24 acres, is largely devoted to outdoor games, and Clifton Park, of 55 acres, is well wooded. Pop. (1901), 54,348.

Rothersey, capital of the island of Bute and of Buteshire, Scotland, beautifully situated at the

Bruce. Edward Baliol recaptured and fortified it in 1334, but it was recovered by Robert II. (while steward of the kingdom), who created David, his eldest son, Duke of Rothersey, which has since been the principal Scottish title of the Prince of Wales. His son Robert III. gave the town a charter in 1400. The ruins of the castle are in an excellent state of preservation owing to the munificence of the Marquis of Bute. The chief buildings include the town hall and county buildings, the public halls, the Stewart Institute, the Royal Aquarium, the Glenburn Hydropathic, the Academy and Thomson Institute. Rothersey Bay affords a magnificent anchorage and throughout the summer presents an animated appearance, being a place of call for the *Columbia*, *Lord of the Isles* and dozens of other Clyde pleasure steamers. Owing to the mildness of the climate and the charming situation (the town faces the Argyllshire highlands), Rothersey is the only considerable holiday seaside resort in Scotland that has a winter season, while in summer it is the haunt *par excellence* of the good people of Glasgow. The herring fisheries form now the leading and almost the only industry, but the first cotton mill in Scotland was erected in Rothersey. Near Loch Fad stands the cottage which



ROTHERSEY.

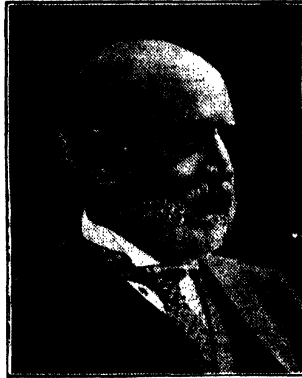
[Photo: Wilson, Aberdeen.]

head of Rothersey Bay. It suffered a good deal in the raids of the Norsemen who harried the West Coast of Scotland in the 12th century, but who were finally ejected after the battle of Largs (1263). In the reign of John Baliol the castle was seized by the English, but surrendered to Robert

Edmund Kean built for himself. Mount Stewart, the seat of the Marquis of Bute, is five miles to the south-east. Pop. (1901), 9,323.

Rothschild, the famous family of Jewish financiers and bankers, derive their name from the

sign of the red shield (*zum rothen Schild*) displayed on their house 148, Judengasse, Frankfort-on-the-Main. (The derivation shows that the popular pronunciation "Roths-child" is quite hopelessly erroneous.) The founder of the house was **MAYER AMSCHEL ROTHSCHILD** (1743-1812). Of his five sons **AMSCHEL MAYER** (1773-1855), the eldest, was born and died in Frankfort, and carried on the business there; **SOLOMON MAYER** (b. in Frankfort, 1774; d. in Paris, 1855), the second, went to Vienna in 1816 and became concerned in Austrian finance; **NATHAN MAYER** (b. in Frankfort, 1777; d. in London, 1836), the third and ablest, settled in Manchester in 1798, became a naturalised British subject in 1804, and in 1805 went to London, where he established himself first in St. Helen's Place and then in New Court, St. Swithin's Lane, which became the permanent headquarters of the house; **KARL MAYER** (b. in Frankfort, 1788; d. in Naples, 1855), the fourth, established the Italian house at Naples in 1821, but this was discontinued in 1861 when the Bourbons fell; **JAMES MAYER** (b. in Frankfort, 1792; d. in Paris, 1868) went to Paris in 1812, and founded the firm of Rothschild Frères. When the house was established in the leading European countries it speedily acquired the foremost place in the world of finance. Rothschild was first; the rest nowhere, although the Barings struggled hard for the predominance in London. Among their brilliant *coups* was the method whereby (partly by pigeon post and partly by accredited agent) they gave the British Government the first news of the victory at Waterloo, the story that they traded on the secret being entirely fictitious. It has been calculated that between 1817 and 1848 the Rothschilds issued loans for no less an amount than £131,000,000. **LIONEL NATHAN** (b. in London, 1808; d. in London, 1879), Nathan's eldest son, succeeded to the direction of the English house in 1836. His repeated election as M.P. for London City called attention to the Jewish disabilities, which were at length removed (1858), and he was the first Jew (Disraeli was a Christian) to take his seat in the House of Commons. His son **NATHAN MAYER, LORD ROTHSCHILD**, was born in London on November 8th, 1840, and educated at Trinity College, Cambridge. He sat for Aylesbury from 1865 to 1885, succeeded to the headship of the English house in 1879, and was raised to the peerage in 1885, being



LORD ROTHSCHILD.

(Photo : Russell & Sons, Baker Street.)

the first Jew to take his seat in the House of Lords. **BARON FERDINAND DE ROTHSCHILD** (b. in Paris, 1839; d. at Waddesdon Manor, Buckinghamshire, 1898) was the grandson of Solomon Mayer, the founder's second son. He married his cousin Evelina, Lord Rothschild's sister, in 1865, and in her memory (she died in the following year) founded the Evelina Hospital for Sick Children. He was an accomplished writer and a well-known connoisseur, and at his death left many of his art treasures to the British Museum.

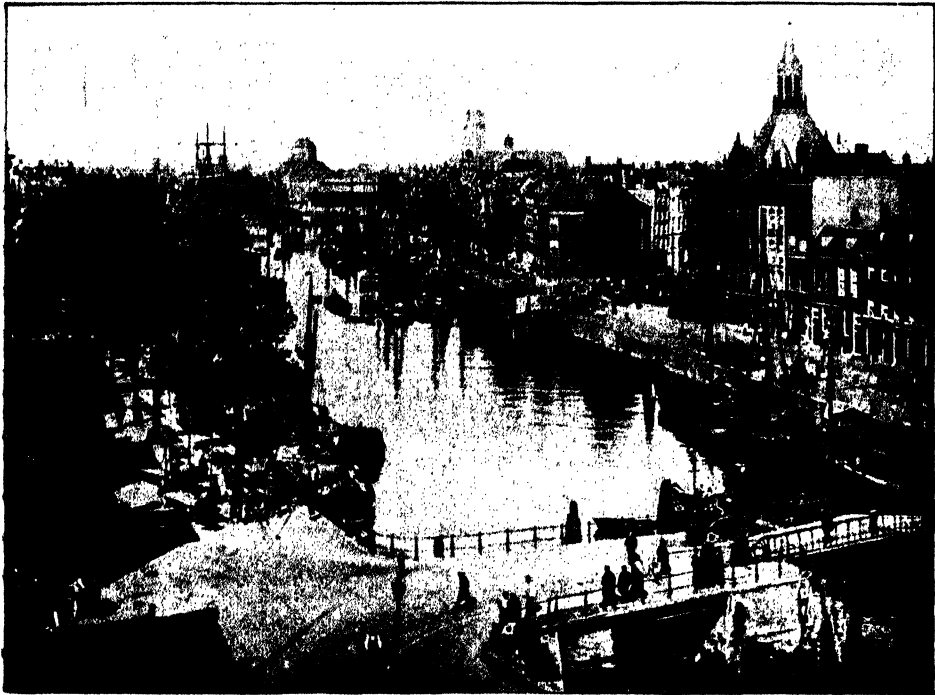
Rotifera, or **ROTATORIA**, or **WHEEL-ANIMALS**, a class of small aquatic animals, which belong to the Worms, or subphylum of Vermes. They are of interest from their beauty when examined under the microscope, and from numerous points in their anatomy and life-history. The body never consists of more than one segment. At the anterior end is a disc-shaped mass provided with cilia, the *ashing* of which causes the disc to appear as if it were revolving: whence the name of the class. The body is generally attached by a process or foot, but in some cases the animal is free-swimming, but has a bifid foot by which it can anchor itself at will (*eg.*, *Hydatina*). The animal is usually protected by a hard cuticle or skin, and this may be surrounded by a tube made of pellets of mud as in *Melicerita*. The body cavity is probably an archicoele. In most cases the male is small and degraded, and appears only to live in order to fertilise the female; it has not yet been discovered in one family (the *Philodinadæ*). In some cases the animals can survive for a long period after being completely dried. The systematic position is obscure; the resemblance of the ciliated disc to the similar organ in the larva known as the *Trochosphere* leads to their inclusion in the Worms. They are world-wide in distribution, live in either fresh or salt water, or in damp moss and grass.

Rot of Sheep, the disease caused by the attack of the parasitic worm known as *Distoma* or *Liver-fluke*.

Rotor. If a rigid body undergo a process of translation only, all points in it move through equal distances along lines which are parallel, *i.e.*, in the same direction. Hence the motion may be represented by a straight line of definite length and direction drawn anywhere—*i.e.*, by a vector. The direction of an axis of rotation and the angular velocity are not, however, sufficient to determine the motion of a rotating body, for the position of the axis will affect the result. Obviously equal rotations about parallel axes are not the same thing. Hence, to represent a rotation, we must have a line of definite length, direction, and position. This is therefore a localised vector, and was termed by W. K. Clifford a rotor, the word being given to it in consequence of its connection with the theory of rotating bodies. A force acting on a solid body is a rotor, for it will lead to a different result whether the force act along one particular line or along a parallel to it, the difference between the two results being expressed as a definite couple. A vector remains unaltered wherever it may move in

space, provided it keep parallel to itself, but two rotors are only identical when they are in the same line and of the same length and sense. The addition of rotors is affected in the same way as the composition of forces or of rotations, and just as the composition of a number of rotations about any axes gives usually not a simple rotation, but a perfectly general motion of the body, so the result of rotor addition is generally not a simple rotor.

intersected by canals, crossed by drawbridges and lined with trees, and has been called "the Venice of the North." Some of these canals, which are tidal, are deep, and allow the ships to come alongside the warehouses. The river, which is from 30 feet to 40 feet deep, has a fine quay, the Boompjes, bordered by elms planted in 1615. There are many quaint gabled houses, and in the Groote Markt is a statue of Erasmus, the city's most illustrious child, who is



GENERAL VIEW OF THE BOOMPIJES, ROTTERDAM.

Rottenstone, the soft, friable mixture of sand and clay resulting from the decomposition of silicious limestones by the action of percolating carbonated water. It may be grey or red, and contains 82 to 86 per cent. of alumina, 4 to 13 per cent. of silica, up to 10 per cent. of carbon and up to 5 per cent. of iron. It should be very fine-grained, meagre to the touch and almost capable of floating in water. It is obtained chiefly from Derbyshire and South Wales, and is a cheap and efficient polishing material for glass, silver, brass, or other soft metal.

Rotterdam, the chief port and second largest city in the Netherlands. It is situated in the province of South Holland, 14 miles S.E. of The Hague and 37 miles S.W. of Amsterdam, and takes its name from the dam at the mouth of the Rotte, which here joins the Nieuwe Maas. The town is

also commemorated by a Latin school. Soon after his death, in 1536, the townsfolk put up a wooden statue to his memory, but this was riddled by the bullets of the Spaniards. The 15th-century Groote Kerke, or Church of St. Laurens, has monuments of De Witt, Kortenaar, and De Brakel, and a very fine organ, said to be better even than that of Haarlem. Other places of interest are the Boymans Museum, with many fine examples of Dutch masters, the town-hall, palace of justice, the Exchange, the Maritime Museum, the Erasmus Gymnasium, the Erasmus birth-house, various educational and charitable institutions and the Zoological Gardens. Since the formation of the New Waterway ocean-going vessels of the largest draft can discharge at the wharves in the heart of the city. The dock accommodation is ample and commodious, and the miles of quayage and warehouses are equipped with the latest appliances.

Owing to its position in the Rhine delta (reinforced by an all-embracing canal system) it secures the lion's share of the sea-borne goods of Western Germany, Austria and Switzerland. The chief industries are shipbuilding, bleaching, distilling, brewing, dyeing, tanning, and the manufacture of sugar, vinegar, candles and shot. Pop. (1900), 332,185.

Roubaix, a town in the department of Nord, France, 6 miles N.E. of Lille. The chief buildings include the Hôtel-de-Ville, St. Martin's Church, and the École Nationale des Arts Industriels. Roubaix is the headquarters of the textile industry in North-east France, there being many mills for combing and spinning wool, spinning and weaving cotton, weaving cloth, velvet and miscellaneous materials, besides dyeing and bleaching. Brewing is also carried on, and tomatoes and grapes are cultivated under glass for the winter market. Pop. (1901), 124,600.

Roubiliac, LOUIS FRANÇOIS, sculptor, was born at Lyons, France, in 1695, and is said to have studied under Nicolas Coustou and Balthazar. Few of the personal incidents of his career are known, but he probably came to London some time after 1730. For Vauxhall Gardens he executed a statue of Handel in 1738 and, in lead, of Milton as Il Penseroso. His studio was situated in St. Peter's Court, St. Martin's Lane, the rooms being afterwards utilised by the St. Martin's Lane Academy. Among his busts were those of Swift, Pope, Lord Chesterfield, Richard Bentley, John Ray, Hogarth



THE NIGHTINGALE TOMB, BY ROUBILIAC.

(Photo: York & Son, Notting Hill.)

and Garrick. His most famous statues were those of Shakespeare (1758), now in the entrance hall of

the British Museum, Sir Isaac Newton (1755) at Trinity College, Cambridge, and Lord President Forbes of Culloden in Parliament Hall, Edinburgh. His most splendid monumental works are the Nightingale monument, where Death, fleshless and shrouded, threatens the young wife sinking in her husband's arms, and the tomb of John Campbell, 2nd Duke of Argyll, with the remarkable figure of Eloquence, both in Westminster Abbey. Roubiliac died in London on January 11th, 1762. He had all the genius of his country for pose and effect, and the vigour and truthfulness of his modelling were astonishing, considering its grace and refinement.

Rouble, or **RUBLE**, a silver coin of Russia, current since the 17th century. It is the legal unit of money, is nominally of the value of 3s. 2d. English, and is equal to 100 kopecks. When silver is of the value of 2s. 4d. an ounce troy, the rouble is only worth 1s. 5½d. In point of fact, little coin now circulates in Russia, paper money of a face value of 100, 25, 10, 5, 3, and 1 roubles taking its place. The imperial and half-imperial gold coins are worth 15 and 7-5 roubles. In official calculations 9-16 roubles are taken as equivalent to one pound sterling.



CHURCH OF ST. OUEN, ROUEN.

(Photo: Frith & Co., Reigate.)

Rouen, the capital of the department of Seine-Inférieure, France, on the right bank of the Seine, 70 miles N.W. of Paris. It communicates with the suburb of St. Sever by bridges and ferries, one bridge (adorned with a statue of Pierre Corneille, a native of the town) resting on the island of Lacroix. A fine view of Rouen may be had from St. Catherine's Hill to the south-east. The Seine has been deepened and bordered with a line of capacious quays, so that a spacious river port has been formed. The town contains many delightful examples of Gothic architecture in its chaster as well as more flamboyant aspects. The cathedral of Notre Dame, begun in 1220, has a west front opening upon the flower-market, this front being

flanked by two towers and covered with statues and carvings. Its length is 435 feet, breadth 124 feet, and height 89½ feet, and the style Early Pointed, and it has three large rose windows. There are also good stalls and some painted glass, while within are tablets commemorating the burial there of Richard I., Geoffrey Plantagenet, and John, Duke of Bedford. The church of St. Ouen, in the perfect symmetry of all its parts, is in its way one of the most beautiful structures in France. Other notable buildings are the church of St. Maclou, the Palais de Justice, the Hôtel-de-Ville, the Hôtel Bourghérondie, the Tour de la Grosse Horloge, and the Musée. There is an excellent botanical garden, and in the Place de la Pucelle a statue of Joan of Arc marks the supposed place of her death (1431). From its cotton manufactures Rouen has been called "the Manchester of France," while some of its special goods have the name of "rouenneries." Other industries are the manufacture of woollen goods, machines, soap, chemicals, earthenware, sugar, copper, iron, together with spinning, tanning, bleaching and dyeing. There is much trade with Paris and Havre, and large ships can ascend to Rouen. The journey by boat to Havre is interesting for its scenery and the places which are passed. The *Itala-magnus* of the Romans, Rouen was greatly harried by the Normans until they established themselves in the country and made it the capital of the duchy of Normandy. In 1204 Philip Augustus united the province to France, but the English held it for a period in the first half of the 15th century. Pop. (1901), 115,914.

Rouge. Jeweller's rouge, employed as a polishing powder for gold and silver, consists of an oxide of iron—ferrie oxide (Fe_2O_3)—and is obtained by heating the sulphate, carbonate, or hydrate of iron in presence of air. Rouge as a cosmetic is a preparation obtained from the safflower (*Carthamus tinctorius*).

Rouge-et-Noir ("red-and-black"), a somewhat complicated gambling game, introduced into France in 1789, but now prohibited in France and Germany, and flourishing only at Monte Carlo. The table upon which it is played has rounded ends, and is narrow in the middle, being divided into four sections, each of which is marked with red and black diamonds alternately. Bands crossing the narrow part of the table divide it into halves, and the ends of the table have concentric yellow bands. Six full packs of cards are used and, after cutting, a row of cards to the number of 31 or more is dealt to *Noir*, and another to *Rouge*. The court cards count 10, and the rest according to pips, and the row that makes the nearest to 31 wins. If the rows are of equal value it is a *refait* and a new deal is required. If each row makes 31, there is a *refait do trente-et-un*, and the bank gets half the stakes. Other points in the game are *couleur* and *inversae*, the former winning if the first card be of the winning colour, the latter if the contrary be the case.

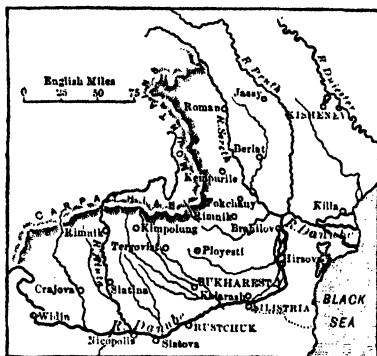
Rouget de Lisle, CLAUDE JOSEPH, poet, was born at Lons-le-Saunier, department of Jura, France, on May 10th, 1760. Though he showed some apti-

tude for musical composition and versifying at an early age, he entered the army and in 1789 was captain of engineers. While at Strasburg in 1792 war was declared against Austria, and in a mood of sudden inspiration he composed the words and music of "The Marseillaise" or, as it was originally called, "Chant de Guerre de l'Armée du Rhin," which set France marching then, and has kept her marching ever since. The violence of the Revolutionaries was hateful to him, and he was imprisoned, only recovering freedom after the death of Robespierre. He was wounded at Quiberon and left the service in 1796. In later years he had rather a hard time, but, in 1830, Louis Philippe gave him the Legion of Honour and a humble pension that enabled him to end his days in peace. He died at Choisy-le-Roi, in the department of Seine-et-Oise, on June 26th, 1836. He was immortalised by his single achievement, none of his other poems or musical compositions winning any reputation.

Roulette (French, "a little wheel"), a French game of chance, now suppressed within the bounds of the Republic. The table has a depression in the centre surrounded with 37 or 38 cells, alternately red and black, numbered 1 to 36, with zero and (in case of 38) double zero. A ball is thrown upon a disc revolving in the central depression, and it drops into one of the cells. Upon the table are arranged the numbers of the cells with the zero or zeros, and the words *pair, passe, noir, impair, manque, rouge*. A player may stake upon any of the numbers or zeros, and on any of the words mentioned. If he stakes on one number and wins, he receives 36 times the stake (counting the stake), if on two numbers 18 times his stake, and so on, a winning stake on 12 numbers bringing him 3 times his stake. A winner on one of the words receives the equal of his stake. *Pair* wins when the ball falls into an even number, *impair* when into an odd number, *manque* if in any from 1 to 18, *passe* if in any from 19 to 36, *rouge* if into a red cell, *noir* if into a black one. If the ball falls into zero, the stakes of those staking on the words are either divided equally between the bank and the players or are "put into prison," in which case the bank or the players take all, according to the chances of the next throw.

Roumania, or RUMANIA, a kingdom of South-Eastern Europe, including the former principalities of Wallachia and Moldavia and the tract of the Dobrudja, bounded on the N. and W. by Austria-Hungary, on the E. by Russia and the Black Sea, on the S. by Bulgaria and on the W., for a short distance, by Servia. It occupies an area of 50,720 square miles. The Carpathians on the northern and north-western borders and their offshoots are the greatest mountains. The Danube on the southern boundary and its many important affluents such as the Schyl, Aluta, Vede, Arjesh, Jalomitza, Buseu, Sereth and, on the eastern boundary, the Pruth are the principal rivers. The Wallachian plain is one of the most fertile regions in Europe, yielding immense crops of wheat, maize, oats, barley and rye, besides flax, tobacco, beet, plums, grapes (for wine) and other fruits. Live-stock are

raised in vast numbers, and bee-keeping is common. The forests comprise oaks, beeches and firs. Petroleum and salt are the chief minerals. The industries, still in their infancy, include textiles, working in metal and wood, pottery, tanning, printing, chemicals and paper. The kingdom is governed by a



SKETCH MAP OF ROUMANIA.

constitutional monarch and a legislature comprising a senate of 120 members elected for eight years, and a Chamber of Deputies of 183 members elected for four years. Wallachia and Moldavia were publicly united on December 23rd, 1861, under the name of Roumania, Colonel Cuza (elected Hospodar, or Lord, of the principalities in 1859) assuming power as Prince Alexander John. A revolutionary intrigue forced him to abdicate in 1866, and Prince Carol of Hohenzollern-Sigmaringen was elected Domn, or Lord, of Roumania on April 20th, 1866. In 1877 the representatives of the people, meeting at Bucharest, declared their country's independence of Turkey, and this was confirmed by the Berlin Treaty of 1878. The principal towns are Bucharest, the capital and formerly capital of Wallachia (276,178), Jassy, the former capital of Moldavia (77,759), Galatz (62,545), Braïla (56,300), Craïova (45,579) and Ploesti (45,107). Kustendje (13,000) on the Dobrudjan seaboard, where great harbour works have been constructed, is the port of Roumania. Pop. (1899), 5,956,690.

Roumanians, a people of the Lower Danube basin and Balkan Peninsula, who are distinguished from all the surrounding populations by their Romance (Neo-Latin) speech, and who are therefore supposed by many ethnologists, as well as traditionally by the people themselves, to be the direct descendants of the Roman military colonists settled in Dacia (the present Roumania) after its conquest by Trajan, hence often called Daco-Romans. But there are some almost insuperable objections to this theory, and, despite their apparent homogeneity, the Roumanians are now known to be of extremely mixed descent, including, besides a slight Daco-Roman substratum, Goths, Huns, Gepidæ, Slavs, and others, all of whom, owing to their very remarkable power of

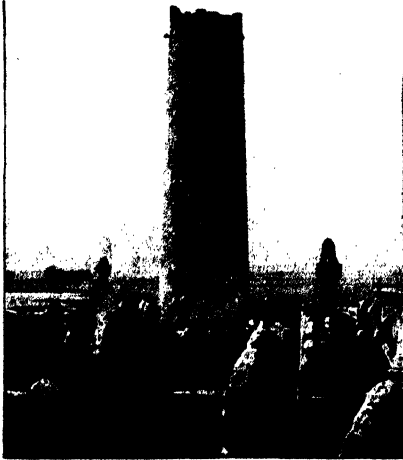
assimilating foreign elements, have been completely merged in a single homogeneous nationality of uniform speech, customs, and political aspirations. Besides the aberrant Kutso-Vlachs of the Pindus Range, there are three main divisions—(1) the Moldavians; (2) the Wallachians, these two forming the great bulk of the inhabitants of the kingdom of Roumania, and numbering about 4,500,000; (3) the Roumanians of Transylvania and other parts of Hungary—2,680,000—to which must be added numerous Roumanian communities in Austria, Servia, Bulgaria, and Bessarabia (Russia) making a total population of from 9 to 10 millions of Roumanian speech. This Italic language, which is cultivated and written both in the Cyrillic (Slav) and Roman alphabets, contains many Slav, Turkish, and Greek elements, and is distinguished from the other Neo-Latin tongues both by its phonetic system and by some structural peculiarities, such as the postfixed article, probably an inheritance of the old Thracio-Illyric language, surviving also in modern Bulgarian and Albanian; thus, *omul* = "man-the," from the Latin *homo ille*. Roumanian is spoken almost everywhere with remarkable uniformity, so that there are no distinct dialects except that of Kutso-Vlachs.

Roumelia, or **RUMELIA**, EASTERN, known since its union with Bulgaria as SOUTHERN BULGARIA, created by the Berlin Treaty (1878), was to remain under the direct authority of the Sultan of Turkey, represented by a Governor-General nominated by the Porte. On September 18th, 1885, this arrangement was upset by revolution, and the union of the province with Bulgaria proclaimed. On April 6th, 1886, the Sultan and Treaty Powers agreed to the appointment of the Prince of Bulgaria as Governor-General, the Mahomedan districts of Kirjali and Rhodope being handed over to Turkey. Prince Alexander, however, having been abducted on August 22nd, 1886, threw up the government on September 7th, and since that date the province has virtually become part and parcel of Bulgaria. Dofia (67,920) is the capital, Philippopolis (42,849), the former capital of Eastern Roumelia, being the seat of a prefecture. The area amounts to 13,700 square miles, and the population (1900) numbered 998,421.

Roundheads, the name bestowed in derision during the Civil War in England by the Royalists upon the Parliamentary troops, in reference to the closely-cropped hair which contrasted strongly with the long and elegantly-dressed locks of the Royalists. The equivalent *tête-ronde* is still applied as a term of reproach in one part of Europe to signify a racial and religious difference, the people so called terming their opponents *tête-carrée* or square-heads.

Bound Towers are found in Ireland to the number of 118, of which 20 are more or less perfect, and Scotland possesses 3 (at Abernethy, Brechin and Eglisbay in Orkney). As to their origin, many theories have been broached, some attributing them to the Phœnicians, and others to the Danes, but general opinion now deems them to be of Christian

origin and to date from the 5th to the 13th century. It is probable that they were used for storing church utensils, also as strongholds, and, upon occasion, as beacons and watch-towers. They are generally from 50 to 120 feet high, diminish in size as they ascend, and are topped by conical roofs. They are divided into storeys communicating with each other by ladders, and each possessing a window, more



CLONMACNOISE ROUND TOWER, IRELAND.

(Photo: Pictorial Agency.)

windows occurring near the roof. The doors were for the most part 8 or 10 feet from the ground. In Orkney and Shetland there are numerous round towers called *brochs*, now in more or less fragmentary condition. They are believed to have been erected by Picts, and it is possible that the later Round Towers may have been imitated from them and been put to analogous uses as fortresses. In that event the peel towers of the Borders, belonging to a still later period, would also be akin to them.

Round Worms. Certain worms belonging to the order *Nematoda* are parasitic in man. They are elongated worms, a transverse section through the body of which is more or less circular or "round." The chief members of this group are the common round worm or *Ascaris*, the threadworm *Oxyuris*, and the *Trichina spiralis*. The common round worm is about 8 inches long and a third of an inch thick. The male is somewhat smaller than the female. The worm inhabits, as a rule, the small intestine, and there are rarely more than 5 or 6 of them found at one time. The symptoms to which the presence of this worm gives rise are usually of a very indefinite character, the most trustworthy indication of their presence being the demonstration of their ova on microscopic examination of the discharges from the bowel. The remedy usually employed is *santonin*.

Boup, a formidable infectious disease which sometimes affects poultry, particularly when they

are overcrowded and kept in a dirty condition. The symptoms are those of severe catarrh with discharge (which soon becomes fetid) from the mouth, nostrils, and eyes. The head swells, the eyes are closed, and the sight may be permanently injured if not destroyed. The disease is rapid in its progress, is apt to be virulent and, owing to its highly infectious character, an affected fowl should at once be isolated. Of several remedies an injection of a weak solution of copper sulphate ($\frac{1}{2}$ ounce to 1 quart of water) may yield satisfactory results, but every poultry-keeper should be apprised beforehand of the best treatment, so that no time may be lost in dealing with an outbreak.

Rousseau, JEAN BAPTISTE, poet, was born in Paris in 1670. His father, a shoemaker, gave him a good education, and Boileau, detecting merit in his early verses, encouraged him to cultivate the gift. He began by writing for the stage, but his efforts were practically failures; but he showed decided talent in lyrical poetry and epigram. In fact it was to his turn for saying bitter things bitingly that he owed the misfortune of his life, for, in 1712, he was banished from France for writing libellous verses, of which, however, he always strenuously denied the authorship. He went to Switzerland, and thence to Vienna, where Prince Eugene protected him. He died in Brussels in 1741, leaving a great reputation as a lyrical poet, which the rolling years have not sustained.

Rousseau, JEAN JACQUES, philosopher, was born at Geneva, Switzerland, on June 28th, 1712, and from his father Isaac, a watchmaker and a man of indifferent character, received a fair education. He was put in an attorney's office at first, but was soon dismissed, and was then indentured to an engraver; but, not liking his employment, ran away, and led a wandering existence for some time. He was taken charge of by a priest, who confided him to Madame De Warens, a convert to Catholicism, who succeeded in converting him from Protestantism. He passed some years with her very happily, and never ceased to speak of her with affection. In the end his connection with her became still more intimate. He succeeded in very little that he undertook, but he learned music, and began to compose it. He could not bear control, and gradually became very jealous and suspicious, and in 1740 left Madame De



JEAN JACQUES ROUSSEAU.

(From the painting by Le Tour.)

Warens, chiefly through jealousy, and in 1742 became secretary to the French ambassador at Venice. He went to Paris afterwards, and managed to live by copying music. He there formed a connection with Thérèse Levasseur, servant at an inn. He had five children by her, who were sent to the foundling hospital soon after birth, and were never traced. In 1750 he competed for the prize offered by the Dijon Academy for the best essay on the question whether learning had improved morality, and, replying in the negative, won. It brought him reputation, and he soon afterwards composed his *Devin du Village*, a comic opera, both words and music, which was successful. His *Lettre sur la musique Française* (1753) aroused much animosity, and he retired to Geneva, changing his religion once more. Thenceforward his life was miserable. He published successively *Discours sur l'origine de l'inégalité parmi les hommes* (1755); *Julie, ou la Nouvelle Héloïse* (1760); *Émile, ou l'Éducation* (1762), and *Le Contrat Social*, the theories of which are constantly traceable as influencing the French Revolution. Each of these caused a sensation, partly by its boldness, partly by its tremendous passion and eloquence. *Émile* was burnt publicly at Geneva and Paris, and Rousseau was obliged to fly. David Hume brought him to England, but he had become so morbidly suspicious that he left abruptly and was at length allowed to return to Paris. His death occurred suddenly at Ermenonville, in the department of Oise, on July 2nd, 1778, and in 1794 his remains were exhumed and reinterred in the Panthéon. His wonderfully vivid *Confessions* appeared after his death. The best English biography of him is that by John Morley (1873).

Rousseau, THÉODORE, landscape-painter, was born in Paris on April 15th, 1812, and studied under Rémond and Guillon-Lethière, but he owed all to his own powers of observation and his intuitive love of nature and art. He travelled for a year or two, and exhibited at the Salon in 1831. In 1835 he was rejected by the jury of that institution and was kept outside till 1849, the reason being that he was a romanticist and the jurymen were classical in their tastes. In 1852 he received the Legion of Honour. The country around Fontainebleau appealed to him so strongly that he painted it constantly and made his home at Barbizon, where he died on December 22nd, 1867. Rousseau was a fine painter, and was finally recognised as one of the great interpreters of landscape. He has had many followers and imitators.

Rowan, commonly but misleadingly known in England as the Mountain Ash, a rosaceous tree (*Pyrus Aucuparia*), native to Europe and Northern Asia, with smooth, ash-grey bark, alternate pinnate leaves with 13 to 17 serrate leaflets; large corymbose cymes of small, creamy-white flowers; and small, scarlet pomes with yellow flesh. It grows at altitudes of 2,600 feet in the Scottish Highlands in rocky situations; and, whilst in Wales and in Kamtschatka drinks are prepared from the berries, they are chiefly noticeable for their beauty in early autumn and as a favourite

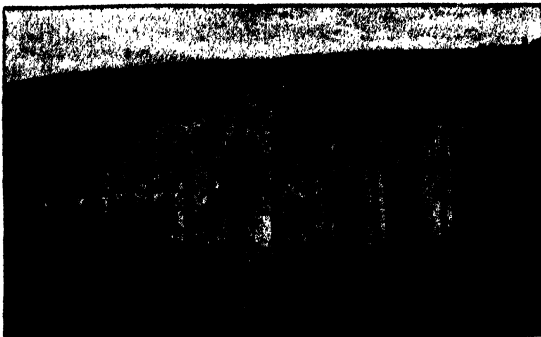
food of thrushes and other birds. A jelly made from the berries has a pleasantly tart flavour and is used in many Highland hostelries with cold roast or boiled beef. Much legendary lore centres round this tree, which in Scotland is the badge of the M'Lachlans; its wood seems to have been used in divination, and its name is said to be connected with the word "run," a mystery.

Rowe, NICHOLAS, poet and dramatist, was born at Little Barford, Bedfordshire, England, in 1674, and educated at Highgate and Westminster School. He was called to the bar, but preferred to write for the stage. His tragedy of *The Ambitious Stepmother*, with Betterton, Mrs. Bracegirdle, and Mrs. Barry in the cast, was successfully produced in 1700. It was followed in 1702 by *Tamerlane*, which became for long a stock piece, in 1703 by *The Fair Penitent*, the gay villain of which, Lothario, acquired a proverbial reputation, in 1706 by *Ulysses, The Royal Convert* (1707), *Jane Shore* (1714), and *Lady Jane Grey* (1715). His most useful work was an edition of Shakespeare (1709), the biography of which is valuable as recording traditions which Betterton had collected at Stratford and which might otherwise have escaped the chronicler. He was the first to prefix a list of *dramatis personæ* to each play, to divide and number the acts and scenes rationally, and to indicate the entrances and exits of characters. On August 1st, 1715, he succeeded Nahum Tate as Poet Laureate, and a verse translation of Lucan's *Pharsalia* was his only considerable achievement in this capacity. He died in London on December 6th, 1718, and was buried in Poets' Corner, Westminster Abbey.

Rowing, the art of propelling a boat by means of sculls or oars. Since the advance of knowledge in the use of sails, and especially since the introduction of steam, rowing has been restricted to small boats, though in ancient times (and in later times in the case of galleys for slaves) large craft have used this mode of progression. The principle of rowing is an application of the lever, the water forming the fulcrum, and, though the oar seems to move a considerable distance through the water, the distance traversed by it is small. The chief points of good rowing are to get a good reach forward, to put the whole weight of the body into the stroke, and to feather, that is, to bring the oar back with the blade flat without touching the water and so stopping the way of the boat. The introduction into England of the sliding-seat, in 1871, worked a great revolution in English rowing. The difference between rowing and sculling is that in the latter a man uses two oars, one on either side, and in the former he uses one oar only. The Thames may be regarded as the home and nursery of rowing in England. The coat and badge founded in 1716 by Thomas Doggett, the actor, to be rowed for annually from London Bridge to Chelsea by young watermen are still a feature of rowing annals. Its first regatta dates from 1755, and rowing clubs began to be formed early in the 19th century, the Leander being founded in 1819, Cambridge University in 1829 and Oxford University in 1839, and London in 1856. The first race

between the two great English universities was rowed in 1829, but as an annual fixture it dates from 1836. Henley regatta was established in 1839. In 1906 a race between Cambridge University and Harvard (in which the former won easily) was expected to lead to more frequent encounters between British and American amateur oarsmen.

Rowlandson, THOMAS, caricaturist, was born in London in July, 1756, and studied drawing at the Royal Academy and in Paris. He had remarkable facility, and, in spite of his dissipated life, managed to produce thousands of humorous illustrations of life. He was a keen observer, and did clever designs for *Dr. Syntax's Tour*, *The Dance of Life*, and *The Dance of Death*. He died in London on April 22nd, 1827. In 1880 a *Selection from his Works*, with a sketch of his life, was brought out by Joseph Grego in two volumes.



MELROSE ABBEY.

(Photo: Wilson, Aberdeen).

Roxburghshire, a Border county of Scotland, of extremely irregular outline, bounded on the N. by Midlothian and Berwick, on the E. by Northumberland, on the S. by the Cheviots, on the S.W. by Dumfriesshire, and on the W. by Selkirkshire. It covers an area of 665 square miles. Most of the surface is undulating, but in the north-west, near Melrose, are the remarkable forms of the "triple" Eldons (highest peak, 1,385 feet). Towards the south the land rises to the Cheviot Hills, among the highest points of which are Windygate Hill (2,034 feet), Catcleuch Shin (1,742), Carter Fell (1,815) and Peel Fell (1,964). On the Dumfries boundary the chief elevations are Roan Fell (1,862), Hartsgarth Fell (1,806), Scaud Bank (1,792), Tudhope Hill (1,961) and Causeway Grain (1,607). The principal rivers are the Tweed, its lefthand affluents the Allan and Leader (separating the shire from Berwick) and its righthand tributaries the Bowden and Teviot. The Teviot is the distinctive stream, however, since its whole course from its rise in the far south-west to its discharge into the Tweed at Kelso after a run of 37 miles

belongs to the shire, the region which it drains being known as Teviotdale. It receives on the right the Slitrig, Rule, Jed, Oxnam and Kale, and, on the left, the Borthwick and the Ale. In the south-west the Liddel, rising in the Cheviots, flows to the Esk through Liddisdale. On the lower lands fine crops of wheat, barley, oats, potatoes, peas, beans and turnips are grown, while sheep and cattle are fed in large numbers on the hill pastures. By the Tweed and the lower stretches of the Teviot beautiful pears, apples and grapes are cultivated, while Kelso nurseries are famous. The mineral resources are of little account. At Hawick, Kelso and Jedburgh the woollen industry is of great importance, cloth, flannels, blankets, tartans, yarn and hosiery being manufactured. In many respects the county is one of the most interesting in Scotland. A memorial of the Picts still exists in the shape of the mysterious Catrail which, originating near Peel Fell, pursues a devious but

generally north-westerly course to Yarrow Church, where it bends eastwards to Torwoodlee near Galashiels. Portions of two Roman roads yet remain—Watling Street, running from Brownhart Law on the Cheviots to Newstead, near Melrose, on the Tweed, and the Wheel Causey (though it has been doubted whether this is Roman) from Bewcastle in Cumberland to near Hobkirk, where its traces cease. After the Romans retired the Britons of Strathclyde held this part of Scotland, and from them it passed by conquest to Northumbria. Malcolm Canmore, however, recovered the territory for Scotland, and by 1160 the Border line was becoming fixed. Constant raids inflicted heavy loss both of life and property on the people, of which one singular instance may be cited. Roxburgh town, from which the shire is named, looked for safety to its castle situated on high ground between the confluence of the Teviot and Tweed. As a place of considerable importance, the English forces besieged and often took it. At last the Scots succeeded in recapturing it in 1460, whereupon, to put an end to the recurring turmoil, they demolished it, its grass-grown ruins still crowning the mound. But when they lost their castle they lost their sole protection from the invader and the lawless, and the inhabitants gradually left the town, which has dwindled into an obscure village. This is a noteworthy instance of the virtual disappearance of a chief town, of which Scotland furnishes another example in the case of Kincardine, once the capital and name-place of Kincardineshire, but now completely vanished. The celebrated Border abbeys of Melrose, Kelso, Jedburgh and Dryburgh (though the last belongs to Berwickshire) are rich in historical associations and renowned for their architectural charms. Much of the modern county history centres round Sir Walter Scott, who made his home for so many years at Abbotsford, where he died in 1832. Floors (French, Fleurs) Castle, near Kelso, is the princely seat of the Duke of Roxburghe. James Thomson, author of *The Seasons*, Jean Elliot,

author of "The Flowers of the Forest," John Home, author of *Douglas*, John Leyden, author of *Scenes of Infancy*, Lord Heathfield, the defender of Gibraltar, and Dr. J. A. H. Murray, editor of the *New Oxford Dictionary*, were all natives of Roxburghshire, of which Jedburgh is the county town. Kirk Yetholm, near the eastern boundary on the Roxburgh slope of the Cheviots, is the headquarters of the British gipsies. Pop. (1901), 48,804.

ROY, WILLIAM, major-general, was born at Milton Head, Carlisle, Lanarkshire, on May 4th, 1726, and was educated at Carlisle and Lanark. He was one of the originators of the trigonometrical survey of Great Britain, being employed in 1746 to make a military map of Scotland, a work he carried out thoroughly. During the ensuing years he was engaged upon his duties as a soldier, in connection with which his skill as a surveyor and draughtsman was frequently utilised. In 1765 a new post was practically created for him when he was appointed surveyor-general of the coasts and engineer for making and directing military surveys in Great Britain, and in 1767 he was elected F.R.S. In 1768 he visited Gibraltar, and afterwards reported on the defence works with proposals for their improvement, and in 1781 was promoted major-general. In 1784 he successfully measured the Hounslow base, the first step towards making an ordnance survey of the United Kingdom, a brilliant achievement, carried out with marvellous accuracy, which procured him the Copley Medal of the Royal Society in 1785. He was afterwards occupied with other trigonometrical operations, but his health failed him, and he died in London on July 1st, 1790. His valuable *Military Antiquities of the Romans in Great Britain* was published in 1793.

Royal Academy, THE, was founded in 1768, under the auspices of George III., and has for its object the encouragement of painting, sculpture, and architecture. It consists of 42 Academicians, of whom two must be engravers, and of 36 Associates, of whom five must be engravers, and gives instruction in painting, sculpture, architecture, and anatomy, rewarding merit with medals and other prizes, besides associateship and membership. The Academy holds an annual exhibition of paintings by living artists (May to August), and a winter exhibition for ten weeks, beginning in January, of the works of Old Masters and dead British artists, while the collection of diploma pictures is to be seen daily. The nucleus of the Academy was the society of Incorporated Artists which William Hogarth was instrumental in founding, and which held its first exhibition at the Society of Arts, Adelphi, London, on April 21st, 1760. The first exhibition of the Academy was held in Pall Mall in 1769, but from 1771 to 1838 it was accommodated in Somerset House. It then removed to rooms in the National Gallery,

Trafalgar Square, from which it was transferred to Burlington House, Piccadilly, in 1868, holding its first exhibition there in the following year. Sir Joshua Reynolds was the first President (1768), and his successors were Benjamin West (1792), James Wyatt (1805; election not confirmed), Benjamin West (1806), Sir Thomas Lawrence (1820), Sir Martin Archer Shee (1830), Sir Charles Eastlake (1850), Sir Edwin Landseer (1866; declined to serve), Sir Francis Grant (1866), Lord Leighton (1878), Sir John Everett Millais (1896; died same year), and Sir Edward John Poynter (1896). In 1805 there had been a temporary misunderstanding between West and the Council, which had been removed before the King ratified Wyatt's election.

Royal Academy of Music, THE, was proposed by Lord Burghersh, afterwards Earl of Westmoreland, a distinguished soldier, diplomatist and musician, at a meeting held at the Thatched House Tavern, London, on July 5th, 1822. It was felt that English students had not the advantages which foreign countries offered. At a second meeting held on July 12th a committee was formed, rules were adopted, and the King, George IV., was announced as chief patron. Dr. Crotch was appointed first Principal with four professors; the number of pupils was not to exceed 40 boys and 40 girls, between the ages of ten and fifteen, all to be boarders in the establishment, which was to be supported by donations and subscriptions. In November, No. 4, Tenterden Street, Hanover Square,



ROYAL ACADEMY (BURLINGTON HOUSE).

(Photo: Pictorial Agency.)

was taken and the Academy was opened on March 24th, 1823. The first report was satisfactory, but financial difficulties occurred, and in 1827 it was decided to close the Academy. A further appeal

enabled the directors to continue their work, and a charter was granted on June 23rd, 1830. Dr. Crotch resigned his post in 1832, and Cipriani Potter was appointed and continued to be Principal until 1859. Again its position became unsatisfactory. It was decided that the management should become entirely professional, and the practice of receiving boarders was abandoned in 1853. A Government grant having been obtained in 1864, the committee were advised to expend the whole of their funds in providing increased accommodation; but by 1867 this was withdrawn as the results of the institution were considered inadequate. It was therefore decided to abandon the Academy, but the committee found they could not legally resign the charter without the consent of every member. So many disagreed with this policy that a new board of directors was formed with the Earl of Dudley as president, and from that time the Academy has prospered. The annual grant of £500 was restored, the premises were enlarged, and the number of students steadily increased. Charles Lucas was Principal from 1859 to 1866, Sir William Sterndale Bennett from 1866 to 1875, Sir George Macfarren from 1875 to 1887 and Sir Alexander Campbell Mackenzie was appointed in 1888.

Royal College of Music, THE, is distinct from the Royal Academy of Music, though allied with it in the advancement of musical education through an associated board due to the initiative of Sir A. C. Mackenzie. In 1876 the National Training School of Music was opened with Sir Arthur Sullivan as principal, his successor being Sir John Stainer in 1881. This was succeeded by the Royal College of Music in 1882, when a charter was granted, the Duke of Edinburgh, Duke of Saxe-Coburg and Gotha, taking a prominent part in its establishment. Sir George Grove was the first director, being followed by Sir Hubert Parry in 1894. Among the many accomplished musicians whom the College has produced is to be numbered S. Coleridge Taylor, the first part of whose celebrated *Hiawatha* was performed while he was still a student.

Royal Institution, THE, was founded by Sir Joseph Banks, Count Rumford and other Fellows of the Royal Society in 1799 and incorporated by Royal Charter in the following year. A site was purchased in Albemarle Street for "an establishment in London for diffusing the knowledge of useful mechanical improvements" and to "teach the application of science to the useful purposes of life" by means of lectures and experiments. In its laboratories Thomas Young, Sir Humphry Davy, William Thomas Brande, Sir Edward Frankland, William Odling, John Hall Gladstone, Michael Faraday, John Tyndall, Sir James Dewar and Lord Rayleigh have pursued their investigations. Since 1833 it has maintained professorships of chemistry and physiology and in 1863 a fund for the promotion of experimental research was established. It has a library of 60,000 volumes; it holds weekly meetings, and courses of public lectures are delivered both on special and general subjects.

Royal Family, THE, consists, in the United Kingdom, of the Queen Consort of the reigning sovereign, the Queen Dowager, and the lineal descendants of the reigning sovereign. The consort of a reigning queen is not a member of the Royal Family, unless, as in the case of Prince Albert, that rank has been specially conferred upon him. The aggregate civil list of the King and Queen amounts to £470,000 per annum. Queen Alexandra receives £70,000 per year during her widowhood. The Prince of Wales has no allocation from the civil list, but enjoys the revenues of the Duchy of Cornwall (nearly £90,000 for 1909).

The principal members of the Royal Family are:—

King George V.	- - - -	b. 1865
Queen Mary	- - - -	b. 1867
Queen Alexandra	- - - -	b. 1844
Prince of Wales	- - - -	b. 1894
Princess Victoria Alexandra	- - - -	b. 1897
Princess Louise (Duchess of Fife)	- - - -	b. 1867
Princess Victoria	- - - -	b. 1868
Princess Maud (Queen of Norway)	- - - -	b. 1869
Duke of Connaught	- - - -	b. 1850

Royal Society, THE, had its origin in a club of learned men, formed in 1645, and meeting first in London, then at Oxford, and then again in London. In 1658 they used to meet at Gresham College, where lectures were delivered, and in 1662 they were incorporated as the President, Council, and Fellows of the Royal Society founded for improving the knowledge of Natural Science. In 1665 the Society first began to publish its *Philosophical Transactions*, and from 1703 to 1727 Sir Isaac Newton was its President. It removed to Burlington House in 1857, and has done much service as scientific adviser to the Government. Research is encouraged by the award of the Copley and two Royal medals, the Rumford medal for researches in light or heat, and the Davy medal for chemical investigations. On the roll of Presidents appear the names (besides that of the illustrious man already specified) of Sir Christopher Wren (1680), Samuel Pepys (1684), Lord Somers (1698), Sir Hans Sloane (1727), Sir Joseph Banks (1778), Sir Humphry Davy (1820), Earl of Rosse (1848), Sir Edward Sabine (1861), Sir George Bedell Airy (1871), Sir Joseph Dalton Hooker (1873), Thomas Henry Huxley (1883), Lord Kelvin (1890), Lord Lister (1895), Sir William Huggins (1900), and Lord Rayleigh (1905), Sir Archibald Geikie (1908). It is extraordinary that such men as Sir John Herschel, Sir Richard Owen, and Charles Darwin were not elected to a post upon which they would have shed at least as much lustre as they received.

Royalty, a payment reserved by the grantor of a patent lease of a mine or similar right, and payable proportionately to the use made of the right by the grantee. It is usually a payment of money, but may be a payment in kind—that is, of part of the produce of the exercise of the right. Royalty has also another signification, namely, a payment made to an author or composer by an assignee or licensee in respect of each copy of his

work which is sold, or to an inventor in respect of each article sold under the patent.

Royer-Collard, PIERRE PAUL, statesman and philosopher, was born at Sompuis, France, on June 21st, 1768. He was a lawyer in Paris at the outbreak of the Revolution, which he at first welcomed, but his sympathy for the Bourbons nearly cost him his life. In 1797 he was elected a member of the Council of Five Hundred, but soon retired. In 1811 he became known to Napoleon, and in the same year and two following years delivered a course of extremely suggestive lectures on philosophy at the Sorbonne. He caught the spirit of the Scottish school, and caused the works of Dugald Stewart and Thomas Reid to be translated. He became Vice-President of the Chamber of Deputies in 1816, and President in 1827, and in the latter year was admitted to the Academy. He died at Châteauneuveux, department of Loir-et-Cher, on September 4th, 1845.

Rubber, a convenient collective name for those mixtures of hydrocarbons with an oxidised substance, found in the latex of most plants, which are pliable and insoluble in water, alcohol, or unconcentrated acids. Only within the Tropics, between the isotherms of 70° F., where the annual rainfall is about 90 inches, do the trees produce this latex in abundance. The chief kinds in commerce are (1) American, including Para, Carthagea (from New Granada), and Ceara; (2) West Indian, including Guayaquil (from Ecuador), Pernambuco, Maranhão, Nicaragua, Honduras, and Guatemala; (3) Asiatic, including Singapore, Assam, Penang, Java, Siam, and Borneo; and (4) African, including Madagascar and the West Coast. Of these, the Para, or Caoutchouc, from the Amazon valley, is the most valuable. It is the produce of various species of the euphorbiaceous genus *Hevea* (*Siphonia*). Carthagea, Guayaquil, Nicaragua, Honduras, Guatemala, and other West Indian or Ulé rubbers come from Castilleja, belonging to the Breadfruit family. Ceara rubber is derived from the euphorbiaceous *Manihot Glaziovii*; that of Pernambuco from *Hancornia speciosa*, belonging to the Periwinkle family; the Gutta sassa of Borneo and the Gutta singarip of Malaysia, from species of *Willughbeia*; and African rubbers from species of *Landolphia* and *Vahea*, all belonging to the same family. The caoutchoucs of Assam, Sylhet, and probably Singapore, are the produce of species of *Ficus*, of which *F. elastica* is the best-known. Though India-rubber has long been known, the discovery of the process of vulcanising gave so powerful a stimulus to the trade in it that this industry may almost be said to have arisen in the last quarter of the 19th century. The United States imports great quantities, while British exports of manufactured rubber grow in value every year. There was a remarkable "boom" in rubber shares during 1910. (*See CAOUTCHOUC AND INDIA RUBBER*).

Rubefacient, a form of external application designed to produce a reddening of the skin and mild counter-irritation. Friction with the hand

is the simplest example of it, but since this cannot be maintained, as a rule, for any length of time, other methods are resorted to. Of these none is more efficacious or more convenient than a mustard poultice or leaf, or oil of turpentine, or capsicum pods steeped in whisky. The Spanish-fly blister is employed when a more powerful agent is required. Many liniments are also of great service.

Rubens, SIR PETER PAUL, painter, was born at Siegen, in Westphalia, on June 28th, 1577, and was taken to Antwerp when ten years of age. He received an excellent education, and began to study art there, especially under Adam Van Noort, after-



THE "CHAPEAU DE PAILLE," BY RUBENS.

wards travelling in Italy, where he occupied himself in copying the masterpieces of Titian and others. The Duke of Mantua took an interest in him, and gave him some commissions, and also sent him on an embassy to Madrid. In 1608 he returned to Antwerp, and was made Court painter to the Archduke Albert. The Princess de' Medici employed him to paint a series of scenes in the Luxembourg, and there he made the acquaintance of the Duke of Buckingham. This superb suite of pictures is now one of the great ornaments of the Louvre. He came to England in 1629, and was taken into favour by Charles I., to whom he presented his magnificent "Peace and War," now in the National Gallery, and whose portrait he also painted. For this he was knighted (1630). He became enormously wealthy and was twice married. His first wife, Isabella Brant, and especially his second, Helena Fourment, have been made familiar to the world by many pictures. On May 30th, 1640, he died at Antwerp, in which city the tercentenary of his birth was kept as a festival. It possesses "The Descent from the Cross," and also "The Raising of the Cross," the former generally considered his best work. Though

his superabundant energy and showy canvases are not to everybody's taste, Rubens possessed certain affinities to Michael Angelo in the grandeur of composition. The Rubens Room in Grosvenor House (the Duke of Westminster's) contains examples of the master so bright and glorious they might have been painted a year ago.

Rubeola, another name for measles.

Ruberslaw, a hill in the parishes of Hobkirk and Cavers, Roxburghshire, Scotland, 5 miles E. of Hawick. It has interesting literary and historical associations. Its dark mass, whose summit is 1,392 feet above the sea, is crowned with a rugged rock, from which, as from a stone pulpit, Alexander Peden "the Prophet" and Welsh preached to the persecuted Covenanters, whenever they succeeded in evading the merciless dragoons. Ruberslaw in storm is said to have suggested to James Thomson, author of *The Seasons*, his poem on "Winter," and "the same scenery in sunshine and shade," according to the Rev. W. S. Crockett, in his sympathetic book on *The Scott Country*, "left its impress on the mind" of John Leyden, who spent much of his boyhood at his grand-uncle's farm almost at the foot of the heath-clad hill.

Rubiaceæ, the third largest order of Dicotyledonous plants, comprising about 4,500 species in more than 350 genera. Though the tribe Galieæ, which is largely represented in England, including Bed-straw (*Galium*), whence the family is named, Woodruff, Madder, etc., is almost exclusively temperate, the other twenty-four tribes of which the order consists (or twenty-five in all) are mainly tropical, being especially abundant in America. They include plants of all sizes, usually with square stems. The leaves are opposite and decussate, simple and stipulate, the stipules in Galieæ being as large as the leaves. The floral whorls have four to six leaves each and alternate, there being only one whorl of stamens and, as a rule, only two carpels. Both calyx and corolla have their leaves united, and are usually polysymmetric. The ovary is inferior, the fruit is various, and the seeds are generally albuminous. The order includes the Cinchonas, Ipecacuanha, Coffee, and Gambir, besides the fragrant Bouvardia, Rondeletia, and Gardenia of greenhouses. Since the type genus, Rubia, contains the Madder plant, the order is also known as the Madder family. Rubia tinctorum, the dyer's madder, is a native of the Mediterranean region. The order is of great value both medicinally and economically.

Rubicon, the modern Pisciatello, a small stream falling into the Adriatic Sea, 10 miles N.W. of Rimini (Latin, Ariminum). In classical times it was the boundary between the province of Gallia Cisalpina and Italy proper. Its historical significance lies in the fact that when Julius Cæsar crossed the river in 49 B.C. to check the ambitious schemes of Pompey, directed against his power if not his life, he committed himself to what his opponents

deemed an invasion of his own country, and thus took a step that was not only irrevocable but possibly also fraught with far-reaching consequences. Cæsar fully realised that the situation was critical. According to Plutarch, in the Langhornes' translation, when he reached the banks of the Rubicon, "staggered by the greatness of his attempt, he stopped, to weigh within himself its inconveniences; and, as he stood revolving in silence the arguments on both sides, he many times changed his opinion. After which he deliberated upon it with such of his friends as were by, among whom was Asinius Pollio; enumerating the calamities which the passage of that river would bring upon the world, and the reflections that might be made upon it by posterity. At last, upon some sudden impulse, bidding adieu to his reasonings, and plunging into the abyss of futurity, in the words of those who embark in doubtful and arduous enterprises, he cried out, 'The die is cast' [*Jacta est alea!*], and immediately passed the river." He soon captured Ariminum, and in due course made himself ruler of Rome. The phrase "crossing the Rubicon" has now become proverbial to denote the adopting of any decided measure which commits one finally and irretrievably to a definite line of action.

Rubidium (chemical symbol, Rb; atomic weight, 85.2). This element was first discovered by Bunsen in 1861, the source being some mineral waters from Dürkheim, in Bavaria, and the method the application of spectroscopic analysis. By this means the presence of the metal could be detected in a few drops of the water, although many tons had to be used before sufficient could be obtained to experiment with. It occurs abundantly in the saline waters of Bourbonne-les-Bains, in the department of Haute-Marne, France. The metal closely resembles potassium, igniting if thrown upon water. Its salts also are very similar to those of potash. Although only existing in very small quantities, the metal is very widely distributed, being found in sea-water, many mineral waters, seaweeds, tobacco, tea, and many other plants, as well as associated with potassium in many minerals.

Rubinstein, ANTON GRIGORYEVICH, pianist and composer, was born of Jewish parents at Wechotynetz, near Jassy, Bessarabia, Russia, on November 28th, 1829. In 1834 the family removed to Moscow, where the father had started a pencil factory. Anton received his first lessons on the piano from his mother, a competent teacher and a woman of high character. At the age of seven he was placed with A. I. Villoing, under whose direction, when 12 years old, he gave a series of concerts in the different countries of Europe. In Paris he met Chopin and later Liszt, who was so transported by the child's playing that he took him in his arms and declared the boy should be his heir in art. In 1843 he returned to Russia, and played with extraordinary success in St.

Petersburg. Next year he went to Berlin to study composition under Dehn. On his father's death, in 1846, Anton suffered great hardships for a couple of years, whilst studying in Vienna, but, settling in St. Petersburg in 1848, his reputation was soon securely established. In 1852 his opera of *Dmitri Donskoi* was produced, and that of *Siberskiye Ochotniki* ("The Siberian Hunters") in the following year. He made another European tour in 1854, became pianist to the Russian Court in 1858, was appointed director of the Imperial Russian Musical Society in 1859, and director of the St. Petersburg Conservatorium in 1862. He undertook a European tour in 1867-70, and along with the violinist Wieniawski, in 1872 and 1873, visited the leading cities in the Old World and the United States, his tour being a veritable triumphal progress, which was repeated in 1885 and 1886 in his series of European concerts in illustration of the growth of musical literature. He died at Peterhof, near St. Petersburg, on November 20th, 1894. His compositions include eleven operas besides the two mentioned already, *Moses* and *Christus* among oratorios, the "Ocean" and other symphonies, his "Persian Songs," and many other



ANTON RUBINSTEIN.
(Photo: Ganz, Brussels.)

admired songs and orchestral pieces. As a composer he lacked dramatic effect, but his technique was magnificent, and as an executant he must always rank with the highest. NIKOLAI RUBINSTEIN (1835-81), his younger brother, was a pianist of remarkable accomplishment, but his fame and gifts were eclipsed by the brilliance of his brother.

Rubric, literally red ochre or red earth; in old manuscripts, printed books and separate articles in specialised books, part was differentiated from the rest of the matter by being

printed in red, such as an initial letter, a title to a chapter, or a direction (in the case of liturgies), the object being in the last-named instance to attract particular attention to a passage or rule. The word was then applied ecclesiastically (and indeed almost exclusively) to the rules and directions for conducting the liturgy and services generally, and in course of time acquired prescriptive force and character. In the English Prayer-book the rubrics are sometimes printed in italics, and sometimes in red ink.

Ruby, or RED SAPPHIRE, one of the most valuable of gems, is the red, translucent variety of crystalline alumina. It is found chiefly in Burma, where a district, 1,915 square miles in area, in the Mandalay division is known as Ruby Mines, Mogok, the chief town, being the centre of the ruby-mining industry. This stone is often termed the Oriental ruby, the best colour being known as pigeon's-blood. The ordinary ruby of lapidaries and watchmakers is red spinel ($MgOAl_2O_3$), crystallising in the Cubic system. It is also called the spinel ruby; when rose-red, the balas ruby; when orange-red, the rubicelle; and when violet, almandine ruby.

Rückert, FRIEDRICH, poet, was born at Schweinfurt, in Bavaria, Germany, on May 16th, 1788, and studied at the universities of Würzburg and Heidelberg. He then became a teacher at Jena, but soon gave up this calling. Between 1815 and 1816 he was editor of the *Morgenblatt*, at Stuttgart, but this vocation, too, he abandoned in order to prosecute his studies in Italy. Afterwards he settled in Coburg for a few years, mastering the intricacies of Oriental literature, which ultimately coloured so much of his poetry. In 1826 he was appointed to the chair of Oriental Languages at Erlangen, and in 1841 to that in Berlin University. From this he retired in 1849, and spent the rest of his long life on his estate near Coburg, where he died on January 31st, 1866. His first volume of verse, *Deutsche Gedichte*, was published pseudanonymously in 1814, as it voiced the feeling of his countrymen under the Napoleonic yoke. Other volumes followed at frequent intervals, but probably his best work was displayed in his translations of Eastern singers. If he is not so direct and simple as the greatest of German lyrists, he is surpassed by none in gorgeous wealth of imagination, and is the equal of any in respect of style.

Rucuyennes, South American Indians, widespread throughout French Guiana, but especially in the Tumuc-Humac Mountains about the head-waters of the Maroni, Paru, and Yary rivers. They call themselves Wayana, a modified form of Guiana, Rucuyenne being the name given them by the surrounding tribes (reaching us, of course, through the medium of the French tongue) from the red rucu dye with which they paint themselves. The Rucuyennes are a branch of the Carib race, and appear to have formerly

been cannibals; they still practise many barbarous customs, such as exposing the youth of both sexes to the stings of ants and wasps as a test of endurance at the age of puberty. The traveller Crevaux asserts that the Rucuyennes are no taller than European girls of twelve, and that at birth they are nearly white, afterwards changing to a bronze or swarthy colour.

Rudd. [RED-EYE.]

Ruddiman, THOMAS, grammarian, printer, and librarian, was born in Boynzie, Banffshire, Scotland, in October, 1674, and educated at the parish school and Aberdeen University, where, at the age of sixteen, he gained the prize for classical learning. He became schoolmaster at Laurencekirk, but, on the suggestion of Dr. Archibald Pitcairne, the Latinist, removed to Edinburgh. Soon after his arrival (1700) he was employed in the Advocates' Library, and in the following years was constantly engaged in editing and revising for the press a variety of books, amongst them a new folio edition of Gawin Douglas's translation of the *Æneid* (1710), the works of William Drummond of Hawthornden (1711), and Patrick Abercromby's *Martial Achievements of the Scots Nation* (1711). In 1714 he published his *Rudiments of the Latin Tongue*, which had, during many years, an enormous vogue, and in the following year brought out a complete edition of George Buchanan's works, a task which involved him in much controversy, owing to his animadversions on Buchanan's character and political opinions. In 1715 he founded a printing business and printed the *Caledonian Mercury*, a paper which warmly espoused Jacobite views. In 1728 he was appointed one of the printers to Edinburgh University, and two years afterwards chief librarian to the Society of Advocates. During Prince Charlie's abortive attempt to win "his ain," Ruddiman lived in partial retirement, from which he emerged, however, to take up the cudgels in defence of the hereditary succession to the throne. In consequence of failing sight he resigned his post in the Advocates' Library in 1752 (his successor being David Hume, the historian and philosopher), and died in Edinburgh on January 19th, 1757.

Rüdesheim, a town of Hesse-Nassau, Prussia, on the right bank of the Rhine, opposite Bingen, 16 miles S.W. of Wiesbaden. It is situated at the base of the Niederwald, near the summit of which was erected Johannes Schilling's superb monument of "Germania," raised in commemoration of the German triumphs in the war with France of 1870-1. The town has a world-wide reputation for the excellence of its light wine. Pop. (1900), 4,812.

Rudolf I., founder of the Imperial House of Austria, and Emperor of the Holy Roman Empire of the German nation, was the son of Albert IV., Count of Hapsburg, and was born on May 1st 1218. Under the King of Bohemia he served against the Prussians, and became

known for valour and wisdom. He enlarged his hereditary domain by matrimony and conquest to such an extent that he was ultimately elected German Emperor and crowned at Aix-la-Chapelle in 1273. His supremacy was not undisputed, but he won over the Duke of Bavaria and ultimately defeated the King of Bohemia in 1278. By judiciously appointing his sons and friends to the overlordship of various states of his unwieldy dominions he maintained his authority, and his reign, useful and beneficent if we consider the circumstances of the period, lasted for nineteen years. He died at Gernersheim, in Bavaria, on July 15th, 1291.

Rudolf II., Holy Roman Emperor, was born at Vienna on July 18th, 1552. Twenty years later he became King of Hungary, in 1575 was made King of Bohemia, and succeeded his father, the Emperor Maximilian II., in the following year. A gloomy ascetic, devoted to alchemy and astrology, his political course was entirely controlled by the Jesuits, under whose guidance he harassed his Protestant subjects, ultimately goading them into rebellion. The Turks took advantage of the general misrule and discontent to invade the Empire. Hungary revolted in 1604, and in 1606 Rudolf's younger brother Matthias, making terms with the Sultan and the Hungarians, compelled the Emperor to cede to him Hungary, Moravia, and the greater part of Austria. The Bohemians showing marked distrust, in spite of the concessions grudgingly made at the last moment, were attacked by the Archduke Leopold, acting for the Emperor, but Matthias went to their aid and Rudolf was forced in 1611 to resign to him the rest of his territories. Rudolf did not long survive this indignity, dying on the 20th of January, 1612.

Rudolf, LAKE, or BASSO NOROK (the native name, meaning "dark water"), a lake of eastern equatorial Africa, lying between the parallels of 2° 26' and 5° N. and intersected in the northern half by the meridian of 36° E. It lies at a height of 1,250 feet above sea-level, is 185 miles long, 35 miles wide at its widest, and occupies an area of 3,500 square miles. Situated towards the northern extremity of the East African rift valley, its shores are almost wholly precipitous, bare, and barren. The water, though saline, is drinkable, and the only considerable affluent is the Omo or Nianam, entering at the northern end. It discharges no stream, and is undergoing desiccation. The lake was discovered in 1889 by Count Samuel Teleki (von Ssek). Rumours of such a sheet of water (called Sumbura) had prevailed for several years before, but the Count's enterprise proved its existence. He named it after the Crown Prince of Austria.

Rudolstadt, capital of the principality of Schwarzburg-Rudolstadt, Germany, finely situated in the Thuringian Forest, on the left of the Saale (a tortuous tributary of the Elbe),

18 miles S. of Weimar. It enjoys high favour as a holiday and health resort. Among its prominent buildings are the Heidecksburg, the principal residence of the Prince, the Ludwigsburg—once a palace, now a museum—the library and the 15th-century church. Various memorials record the visits of Schiller. There are manufactures of porcelain, dyestuffs, and children's building blocks of artificial stone, besides bell-founding and wool-spinning. Pop. (1900), 12,400.

Rue (*Ruta graveolens*), the type of the large order Rutaceæ, a native of the south of Europe, commonly cultivated in England. It is a shrubby plant, two or three feet high, with pinnately divided bluish-green leaves, beset with glands containing a powerfully-smelling oil, and with corymbs of yellowish flowers. The calyx consists of four persistent sepals; there are four distinct petals, eight or ten stamens of unequal length, and four carpels united into a stalked four-chambered ovary with a single style. The plant is used to keep off noxious insects, and as a stimulant and narcotic in flatulence and hysteria; but is dangerous in large doses. It was formerly called "herb of grace," because it was employed as a sprinkler of holy water: as Ophelia said (*Hamlet*, iv. 5), "We may call it 'herb of grace' o' Sundays." In the Middle Ages it was highly reputed for its power of averting contagion, and in folklore was a favourite witches' drug.

Rue, OIL OF, one of the class of substances known as essential oils. It is obtained from Common Rue (*Ruta graveolens*) by distillation with water. It is a bitter liquid, with a disagreeable odour. It may be solidified if cooled, and boils at about 230°C. Chemically it consists chiefly of a compound known as methyl-nonyl-ketone ($C_{11}H_{22}O$), which is a fluorescent liquid boiling at 225°C. The oil is used in medicine, although not very extensively.

Ruff (*Machetes pugnax*), a bird of the Snipe family, the sole species of its genus. It was formerly abundant in England, especially in the fen-lands; but since that part of the country has been drained and brought under cultivation the bird has been driven from its old haunts, and is chiefly known as a visitor, principally from Holland, where the species still breeds, as it does also throughout most of Northern Europe. It winters in Africa. The male bird is about a foot long, and in the breeding season develops a crop of curly feathers on the sides of the head and round the neck a large ruff or frill, which serves as a shield in its combats with its rivals. It is in reference to its fighting propensities that the specific name of *pugnax* was bestowed upon it, the most furious battles taking place between the males for the possession of the females. The general plumage is brown with black and white markings; the ruff varies greatly in colour, as Sir Thomas Browne remarked, no

two specimens being exactly similar. In winter the Ruff loses its frill and becomes much plainer in colour, then resembling the hen bird or Reeve (as it is called) in plumage, though always maintaining its larger size, so that the sexes may still be readily distin-



RUFF.

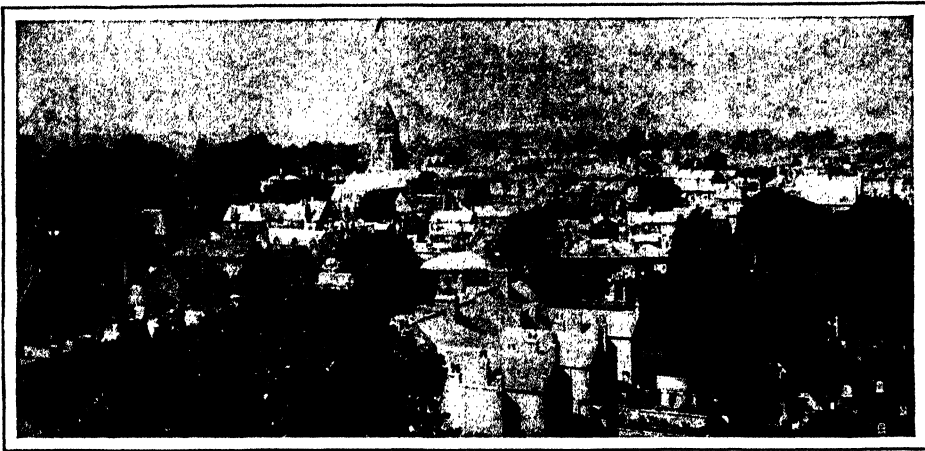
guished. In summer the difference is obvious at a glance, since the female wears no frill. If the females are less numerous than the males, as seems to have been the case when the birds frequented the English Fens, this may account for the combativeness of the males. These birds were formerly fattened for the table.

Ruffe (*Acerina cernua*), a small fish belonging to the Percidæ, a family of the Acanthopterygian or Spiny-finned order. They occur in the rivers of Europe and closely resemble the perch not only in their habits but also, as Thomas Muffett said in *Healths Improvement* (1655), in "the goodness of their flesh, though their skin be rougher: the best live in sandy places where they wax exceeding fat and sweet"—an opinion, as Miss Emma Phipson reminds us, which Izaak Walton endorsed. The Ruffe is olive-green in colour, marbled and spotted with brown, its popular name being derived from the harshness of its scales. It was also known as the pope and the ruggel. It was first noticed by Dr. John Caius, of Cambridge, who sent a drawing of a specimen which he found in the Yare, near Norwich, to Conrad von Gesner, the distinguished Swiss naturalist.

Rugby, a town of Warwickshire, England, pleasantly situated on the Avon, 15 miles N.E. of Warwick. It is an important railway junction, and has a fine station; but it is chiefly known for its public school, founded by Lawrence Sherriff (a merchant grocer and native of the town) in 1567, which has a great reputation and is housed in handsome buildings. Part of the endowment consists of the

land near the Foundling Hospital in London on which Lamb's Conduit Street has been built. The original school was erected opposite to the parish church on a site now occupied by almshouses, but was removed to the south side of the town between 1740 and 1750. In 1809 the older schools and headmaster's house were rebuilt in their existing collegiate style. To commemorate the tercentenary (1867) extensive additions and enlargements were made, including the gymnasium, pavilion, chapel, quadrangle, art museum, observatory, the Temple reading-room, and several other features. The modern renown of the school is owing to Dr. Arnold and his worthy successors—Archbishop Tait, Archbishop Temple, Dr. Jex Blake, and others—and to the prestige brought to it by Dean Stanley, Thomas

Ruge, ARNOLD, publicist, was born at Bergen in the island of Rügen, Germany, on September 13th, 1803, and studied philosophy at the university of Jena, where, with other students, he went into rebellion, and received six years' imprisonment in consequence. He was a follower of Hegel, and in 1830 published a translation of the *Edipus Colonus* with a tragedy of his own, *Schill und die Seinen*, and in 1832 a work on *The Esthetics of Plato*. He started a high-class periodical of an advanced type at Leipzig, the Liberalism of which at last led to its suppression (1843). Ruge then went to Paris where he tried to collaborate with Karl Marx, whose Socialism, however, proved too anti-pathetic. He afterwards retired to Zürich and engaged in publishing, but here and again at Leipzig the long arm of arbitrary government



GENERAL VIEW OF RUGBY.

[Photo: Dean, Rugby.]

Hughes, and other old Rugbeians. A Lower School was opened in 1878. Other buildings in the town comprise St. Andrew's Church (rebuilt in the Decorated style in 1879, the nave of the old edifice forming the north aisle, named the Moultrie Aisle, after the poet John Moultrie, whose rectorship synchronised with Arnold's headmastership), the town hall, the market hall, the Hospital of St. Cross, and the Public Library. The Rochberie of Domesday Book and known as Rokeby till the time of Elizabeth, Rugby is believed to be of considerable antiquity. Roman remains have been found in the vicinity and the remnants of two tumuli suggest British barrows. Oliver Cromwell was quartered here in 1645 and in 1690 William III. passed through the town on his way to Ireland just before the battle of the Boyne. In the present day the town is popularly known in connection with the variety of football to which it has given its name. Pop. (1901), 16,830.

put him down forcibly. The revolution of 1848 found in him an ardent friend, but he had to leave the country. He took refuge in Paris for a short time, and in 1849 went to London, where he was occupied in teaching, writing, and translating English classics, like the *Letters of Junius* and Buckle's *History of Civilisation*, into German. He died at Brighton on December 31st, 1880.

Rugeley, a town of Staffordshire, England, on the right of the Trent, 9 miles E.S.E. of Stafford. It has a pleasant environment, Wolseley Park to the north-west, and Beaudesert Park to the south, being in the immediate proximity, while the Grand Trunk Canal and a rivulet from the Jockey Hills in Cannock Chase pass through the town. The tower and chancel of the old parish church are still extant, the chancel having been partially restored for the purposes of public worship. The principal structures include the Grammar School.

(founded in 1611 and reorganised in 1875), the Public Buildings in the Decorated style (consisting of the municipal offices, market hall, and assembly room), the Free Library and the Hospital. The chief industries are iron-founding, milling and tanning, while in the parish are extensive collieries. Pop. (1901), 4,447.

Rügen, the largest European island belonging to Germany. It is situated in the Baltic, about a mile from the coast of Pomerania. There is communication by rail and ferry with the mainland at Stralsund. Of very irregular outline Rügen measures 32 miles from north to south and 25½ miles from east to west, its area amounting to 370 square miles. The surface is mostly flat, but rises in the peninsula of Jasmund to 505 feet. The soil is fertile, yielding good crops of wheat and rape, and the sea-fisheries are important. Cattle and horses are reared in considerable numbers. Bergen (4,000) is the capital, and other towns, many of which are popular sea-bathing resorts, are Garz, Putbus, Sassnitz, Göhren, Sagard and Friedrich-Wilhelms-Bad. The pagan Germanic inhabitants were dispossessed by the Slavs, but heathenism flourished hardly till the 12th century. Under Danish suzerainty the island was governed by native princes for a period, but it passed into the possession of Sweden in 1648, and so remained until it became Prussian in 1815. Pop. (1900), 46,270.

Rugosa, a group of Corals, including most of those of the Palæozoic period, and therefore of much interest to geologists. The value of the order is, however, very uncertain, and some zoologists are inclined to merge it in the *Apocorosa* group of ordinary Corals. It differs from this by the fact that the septa are arranged in multiples of four and not of six, and that there is usually one or more fossule, or gaps left by the suppression of one or more of the septa. "Some of the *Rugosa*," writes Professor P. Martin Duncan, "may have been corals having soft parts, something like those now existing, but others were probably Alcyonarians, and not a few must be classed near the *Millepores*." Reef-builders of the Palæozoic age, the *Rugosa* have modern representatives in the small *Guyoria* and *Duncania* of the floors of the Mediterranean Sea and Atlantic Ocean. The *Rugosa* are divided into three groups:—

- (1) *Cyathophylloidea*, in which there is a zone of vesicular tissue around the margin of the coral;
- (2) *Zaphrentoidea*, in which this zone is absent, and the spaces or "loculi" between the septa are open;
- (3) *Cystiphyllloidea*, in which the whole coral is full of vesicular tissue, while the septa are reduced to mere marginal striæ. The members of this group occur only in the Silurian and Devonian.

Ruhrort, a town of Rhenish Prussia, Germany, situated at the confluence of the Ruhr with the Rhine, 16 miles N. by W. of Düsseldorf. It

possesses the most extensive river-harbour on the Continent, being the chief shipping-port of the coal-field of Westphalia. Grain and timber are also exported. Its industries include dye-works, tanneries, brick-fields and puddling furnaces, and it has manufactures of machinery and iron- and tin-ware, as well as some shipbuilding. Pop. (1900), 12,407.

Rullion Green. [PENTLAND.]

Rum, an ardent spirit distilled from fermented molasses. The mixture is allowed to ferment for a period varying from nine to fifteen days, and is then sent to the still. The first product is called "low wines," and the second distillation results in rum, the "Jamaica proof" rum being such as will admit of the sinking in it of olive-oil. One of the constituents of rum is butyric acid, and spurious rum is sometimes made by the admixture of this acid to other spirit. Pine-apple rum owes its name and peculiarity to the addition of sliced pine-apples to the fermenting mixture. Much rum is now received from British Guiana, and the spirit is said to be acquiring a more considerable hold on public taste than it has had for a century; no doubt owing to the difficulty of solving the question, "What is whisky?"

Rum, the largest of the group of Small Isles, of the Inner Hebrides, off the west coast of Scotland. They once belonged to Argyllshire, but, on a rearrangement of boundaries in 1891, were transferred to Inverness-shire. Owing to the constant Atlantic roll, Rum is not accessible from the west, but Loch Scresort, on the east coast, offers a practicable landing-place. The surface is mountainous, several summits (*Haskeval*, *Sgurr nan Gilleann*, and *Halewal*) considerably exceeding 2,000 feet in height. The parish church of Small Isles is situated in the northern quarter of the island. Sleat Point, the southernmost part of the Isle of Skye, is about 9 miles distant.

Rumania; Rumanians. [ROUMANIA; ROUMANIAN.]

Rumbling Bridge, a picturesque spot on the confines of Kinross-shire and Perthshire, Scotland, 4 miles N.E. of Dollar. The stream is here crossed by "two brigs," built in the same vertical line but at different levels. The lower bridge, constructed in 1713, is now moss-covered and inaccessible, and the newer one, erected many feet above the older, dates from 1816, and carries the high road over the river, which pursues its brawling course 120 feet below. A beautiful view to the east and west may be had from the bridge, which derives its name from the rumbling caused by the continuous roar of the *Devon*, a feature that was probably more noticeable during the user of the first bridge. Above the bridge is the Devil's Mill, formed by the rush of the *Devon* through a narrow precipitous gorge, from which the river emerges over a small fall into a large basin, where it looks like a mass of seething water. If the spectator listens he will

hear, ever and anon, the "clack-clack" which suggested the notion of a mill. Below the bridge is the Caldron Linn, the most graceful waterfall in East Central Scotland. It was formerly of grander dimensions, but several collapses of rock, notably in 1886, curtailed its height. The fall is in two parts. The upper has gradually worn down through the rock and formed round pots, or caldrons (connected right across the stream), through which the water



RUMBLING BRIDGE, NEAR DOLLAR.

(Photo: Andrew Yarrow, Burntisland.)

boils and surges. The middle pool, into which this section of the fall is precipitated, is very deep. The river is the "clear-winding Devon" of one of Robert Burns's songs. About three miles to the south-west of Dunkeld, in Perthshire, a cascade on the Braan, a right-hand tributary of the Tay, is also called RUMBLING BRIDGE, the enviroing scenery being of surpassing loveliness.

Rumford, COUNT VON, scientist, whose real name was BENJAMIN THOMPSON, was born at North Woburn, Massachusetts, on March 26th, 1753, and acquired in early youth a taste for natural philosophy, which he studied deeply. During the War of Independence he favoured the British connection, and in 1779, after a visit to England, was made F.R.S., and in the following year was appointed Under-Secretary of State for the Colonies, a post he held for thirteen months. He had some military and administrative capacity, and was sent to America in command of a troop, and on his

return was knighted (1784). He then entered the Duke of Bavaria's service, and did much work in civil and military posts. He became a Count, and in 1795 returned to England. During a visit to Ireland in 1796 he introduced considerable amendments in the hospitals and workhouses of Dublin, and, on returning to London, devoted some attention to improving the Foundling Hospital. In respect of the cooking of food and the warming of houses effectively and economically he was an expert, and his experiments in connection with gunpowder, projectiles, and electricity led him to discover that heat is a mode of motion, thus demolishing the material theory at a blow. In 1796 he presented to the Royal Society the sum of £1,000 to found a gold and also a silver medal, which were to be presented every other year to the discoverer of the most important fact in Light and Heat. Both the first Rumford medals were unanimously bestowed on himself (1802). In 1796 he returned to Bavaria, but when he appeared in London two years later as Minister for Bavaria, George III. refused to receive a subject in that capacity. In 1799 he opened up negotiations in different quarters that resulted in establishing the Royal Institution in Albemarle Street, London, of which he was the first secretary. He died at Auteuil, near Paris, on August 25th, 1814.

Ruminants (Latin, *Ruminantia*), animals of the sub-order Artiodactyla (even-toed) of the order Ungulata. They are broadly divided into the true Ruminants and the camel tribe, including the llamas. The former comprise the horned Ruminants (such as the ox tribe and the deer tribe) and the chevrotains or deerlets. Excepting in the camel and llama, there are no cutting-teeth in the middle of the upper jaw, these being replaced by a callous pad on which the lower incisors impinge during mastication. The canine teeth of the lower jaw appear like lateral incisors; they are usually absent from the upper jaw, but are enormous—projecting far down outside the lip—in the musk deer, Chinese water deer, and muntjacs. The molars or grinders are six on each side of each jaw, their surfaces wearing down unevenly by the lateral movement of mastication. The Ruminants exhibit a fair amount of intelligence, though lacking the powers of perception and memory displayed by the higher forms of Mammalia. They are very widely distributed, being found in all the continents of the globe. The distinctive feature, however, from which they take their name, consists in their ruminating or chewing the cud as part of the digestive process. If the action be observed in the cow, for instance, it will be seen that the animal swallows each mouthful of grass at once and continues to browse until it has satisfied its appetite. It then seeks for a sheltered spot where, having lain down, it chews the cud at leisure. For this purpose it "brings up" a certain quantity of the already swallowed grass, and then works this between

its grinding teeth at the back of the jaws, moving the lower jaw uniformly from right to left. When the food has thus been converted into pulp it is swallowed again and a fresh bolus is forced up into the mouth for similar treatment. This goes on until practically the whole of the food originally swallowed has been operated on. A complicated stomach is needed for this process, and accordingly we find that—save in the camels and llamas and to some extent the chevrotains—the Ruminant stomach is divided into four compartments. These are, in the order of their use, the paunch, honeycomb bag, manyplies, and reed, which are, however, called into play in a modified and intermittent fashion, which will now be concisely explained. The unmastered food is swallowed by the gullet, *a*, into the capacious paunch (or rumen, *b*), and it is not until this is filled that the process of digestion begins. When full, the paunch contracts and drives a part of the food into the honeycomb bag (or reticulum, *c*), the walls of which form it into a bolus and then force it into the gullet and so to the mouth, where it is chewed, salivated, and made quite pulpy, when it is once more swallowed. Being now soft and half-fluid it enters the manyplies (or psalterium, *d*), between the numerous plies or folds of which it gradually filters to the reed (or abomasum, *e*), the true stomach. Here it is acted on by the gastric juice secreted by the walls, and from this the unassimilated portion of the food passes to the intestine. There is a groove in the upper wall of the honeycomb bag which regulates the raising of the bolus to the mouth. After this bolus has been reduced into pulp and swallowed into the manyplies, the groove in the honeycomb bag is pushed open by another bolus which is "brought up" to be chewed. Most of the organs of the stomach are familiar in the article of diet called tripe. The true stomach (sometimes known as the fourth stomach) is that used to curdle milk in cheese-making. In the chevrotains the manyplies is so greatly reduced in size that it can hardly be said to be present. It is also wanting in the camels and llamas, in which, however, the reed or true stomach is of great length. In the walls of the paunch of these animals, moreover, are water-cells, which, when full, are capable of holding a gallon and a half of water, a providential



RUMINANT STOMACH.
A, EXTERIOR; B, INTERIOR.

arrangement in the case of creatures which frequent desert or sterile places. It will be easy to understand, from the description of the process of chewing the cud, the literary use of the word "ruminant" to indicate a brooding condition of the mind.

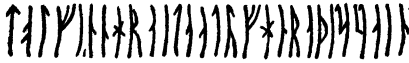
Rump Parliament. [LONG PARLIAMENT.]

Runcorn, a seaport, Cheshire, England, on the left bank of the Mersey, 12½ miles S.E. of Liverpool. It is a town of considerable antiquity, and is believed to have been founded by Ethelfleda, daughter of Alfred the Great. The rock on which stood the castle which she caused to be erected as a barrier to Danish incursions was removed to make way for the Manchester Ship Canal, though the fortress itself had perished long before the construction of that waterway. The Mersey contracts here to a width of only 400 yards at high tide, the comparatively narrow passage being known as Runcorn Gap: the Ship Canal follows the southern shore. It was the Duke of Bridgewater's Canal, however, completed and opened in 1773 under the direction of James Brindley, which laid the foundations of the town's prosperity: this canal was acquired by the Manchester Ship Canal Company. There are extensive docks, warehouses, sheds, and quays, equipped with the latest appliances for loading and unloading craft. There is a large traffic in china-clay, flint, china-stones, bone-ash, and other potters' materials, besides very heavy dealings in miscellaneous goods. The principal manufactures are chemicals, soap, and alkali, but tanning and iron-founding are carried on on a scale of some magnitude. Though the Early English church of All Saints is modern (1849), it occupies the site of a structure already in existence in the 10th century. The chief buildings are the Town Hall, Public Hall, Seamen's and Boatmen's Institute, Custom House, Market Hall, Foresters' Hall, and Free Public Library. The river is crossed by a fine lattice bridge of the London and North-Western Railway, which also carries a footway for passengers. Pop. (1901), 16,401.

Runeberg, JOHAN LUDWIG, poet, was born at Jakobstad, in Finland, on February 5th, 1804, but always used the Swedish tongue, and his first volume of *Dikter* ("Poems," 1830) met with an enthusiastic welcome from Sweden. He graduated at Åbo University, and became Roman tutor at the university of Helsingfors (1831), and afterwards (1837) professor of Greek and Latin at Borgå Gymnasium, of which he was chosen rector from 1847 to 1850. In 1851 he visited Sweden, and was hailed as a great poet. After 1863 he wrote little, and died at Borgå on May 6th, 1877. His lyrics are often very beautiful, and have been translated into English. Among his works should be mentioned *Elgskyttarne* ("The Elk Hunters," 1832), *Hanna* (1836), an idyl in hexameters, *Nadeschda* (1841), a romance of Russian life, *Kung Fjalar* (1844), romances in unrhymed verse,

and *Fänrik Ståls Sägner* ("Ensign Steel's Stories," 1848), poems of the war of independence in 1808. He essayed comedy unsuccessfully, but showed greater aptitude for tragedy in *Kungarne på Salamis* ("The Kings at Salamis," 1863).

Runes, a written language of the Northern tribes of Europe. The Norse runic alphabet contained sixteen characters, while the Anglo-Saxon contained forty. The Germans practised



RUNIC WRITING.

runic writing, and Goths and other Teutonic tribes carried the practice to Spain, etc. The alphabet is sometimes ascribed to the Phœnicians, but many hold that it did not originate till after the introduction of Christianity. Owing to its employment in magic rites, the Church looked with disfavour on its use. The word in Old Norse means also "a secret": cf. Germ. *raunen*, "to whisper." Examples are still to be found in the sculptured stones of Scandinavia, Scotland, and Ireland. There is a particularly fine specimen in the parish church of Ruthwell, Dumfriesshire.

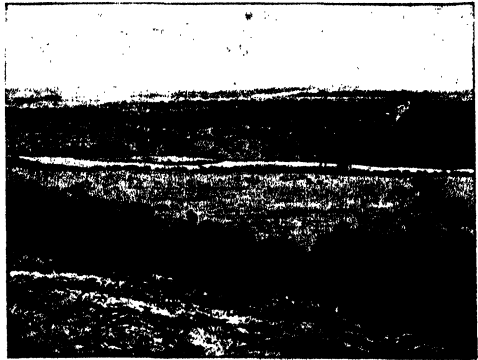
Runjeet Singh, or **RANJIT SINGH**, the consolidator of the Sikh power in the Punjab, India, the son of Mahan Singh, a Jat Sikh of some influence, was born at Gujranwala on November 2nd, 1780. He early showed great capacity for administration as well as government, but remained in his birthplace till 1798, when he became ruler of Lahore, entrusted to him by the Afghan Zaman Shah. Runjeet at once realised that could he but induce the governors of the Sikh states to act together, a powerful and homogeneous province might be founded, strong enough to acquire at least a position of semi-independence. Slowly but gradually he strengthened his position, effecting an alliance with the British in 1809, and, four years later, acquiring the fort of Attock on the Indus, as well as the famous Koh-i-noor diamond, which he obtained from Shah Shuja, then a refugee in Lahore. Pressing his conquests he captured Multan in 1818, and in later years achieved the partial reduction of trans-Indus territory, as well as the Peshawar valley. He had the wit to avail himself of the help of

European officers in conducting military operations, and to their aid much of his success was due. He maintained friendly relations with the British till his death on June 27th, 1839. But the removal of the Lion of Lahore meant ruin to his schemes. Disorders arose among the Sikhs, and, after two campaigns, the British annexed the country in 1849.

Runner, a prostrate branch rooting at its node, where it gives rise to new plants, as in the strawberry and some allied plants.

Runner, the name applied to a detective officer before the institution of the constabulary in England. Bow Street being the headquarters of this kind of police force, they were commonly called "Bow Street Runners." The term was also used of the scouts privately employed at gambling dens to give timely notice of the approach of inspectors or other persons presumably unfriendly to gaming hells.

Runnymede, a broad meadow by the Thames, on the right bank of the river. It is situated in the parish of Egham, Surrey, 21 miles W. by S. of London. Here, on June 15th, 1215, the barons of England extorted the Great Charter from their shift King. Though the deed is sufficiently explicit, it has been disputed whether John signed it here or on the adjoining Magna Charta Island. Cooper's Hill, which rises from the meadow to a height of 142 feet, and which was sung in 1642 by Sir John Den-



RUNNYMEDE.

ham, commands a beautiful view of the historical site as well as of the Thames Valley.

